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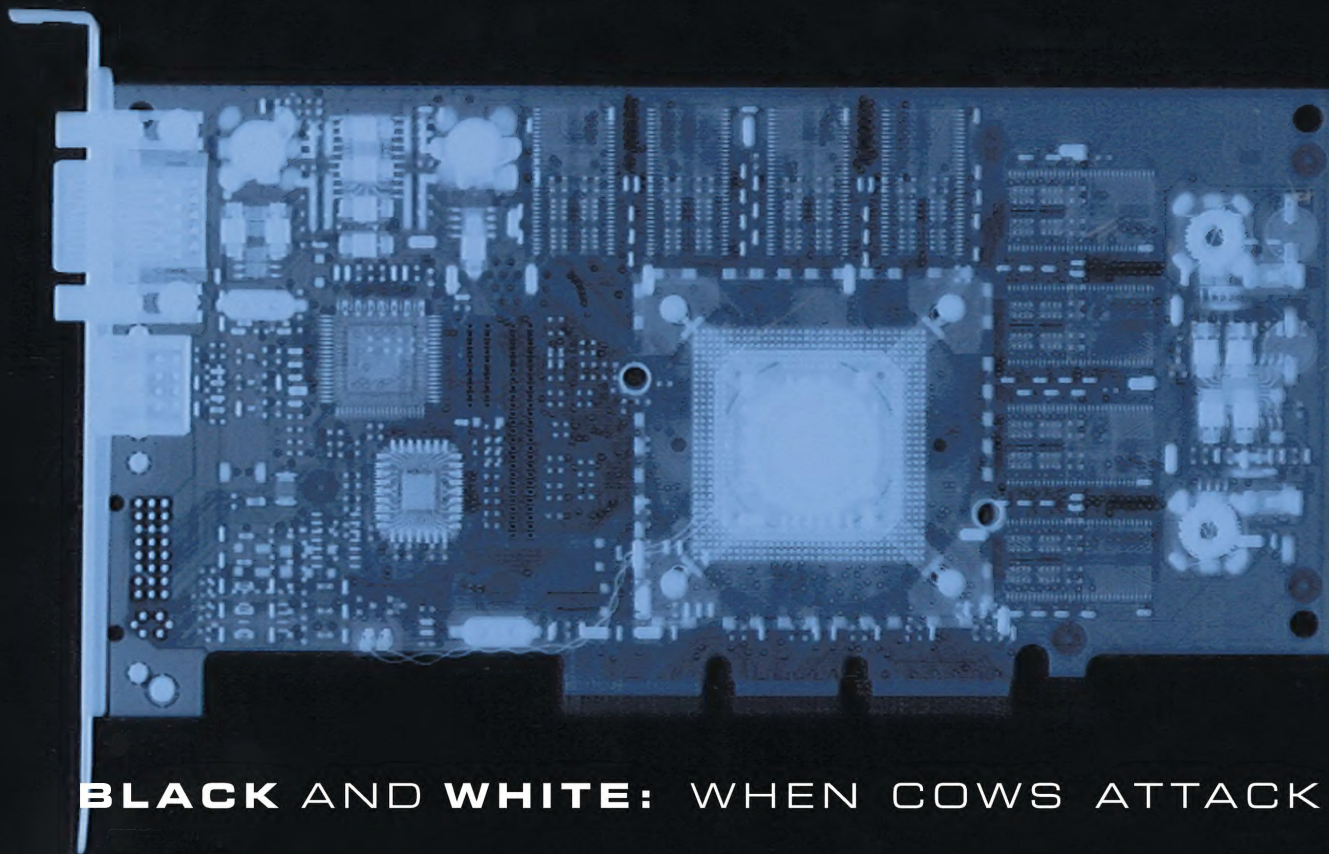
# atomic

**MAXIMUM POWER COMPUTING**

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**100% Australian Issue four**

## GeForce3: X-RAY SPECS



**BLACK AND WHITE: WHEN COWS ATTACK**

**AMD SUPERCOMPUTER** 64GHz of Athlon Grunt  
**QUANTUM COMPUTERS** Messing with Atoms  
**DVD vs VCD vs DIVX** Battle of the Movie Stars  
**BIOS TWEAKING** Inside the Scary Blue Zone  
**TWIN CPU SYSTEMS** Dual Duel  
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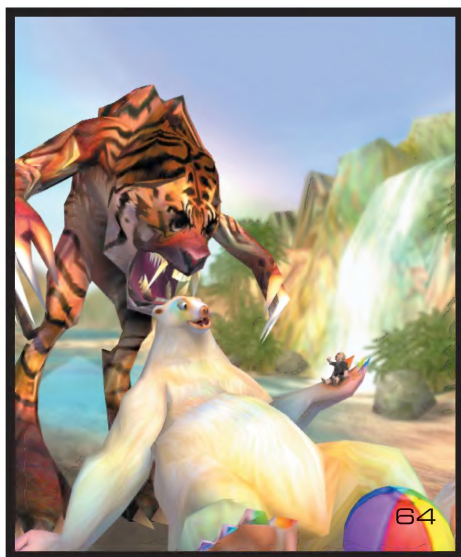
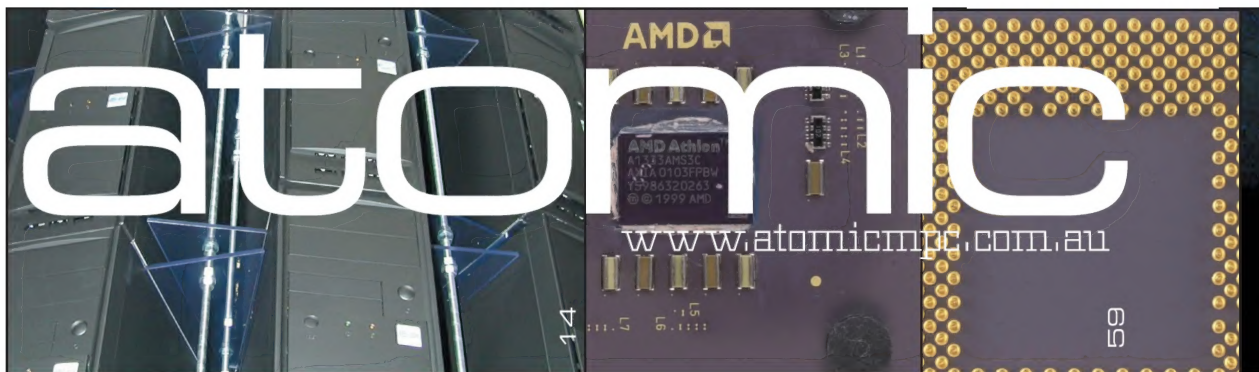
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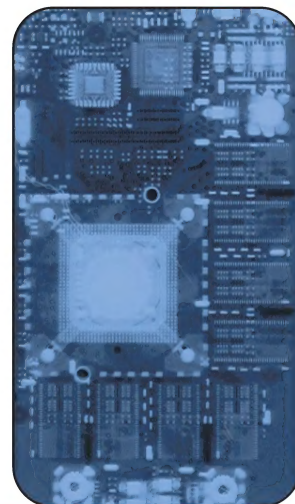
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Enter the Blue Zone without fear. Squeeze every last drop of speed out of your box

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# LIGHT SPEED Inside the GeForce3 30

This month's paradigm leaping order of magnitude revolution in technology is the NVIDIA GeForce3. There's good and bad news – and we're not just talking about the price

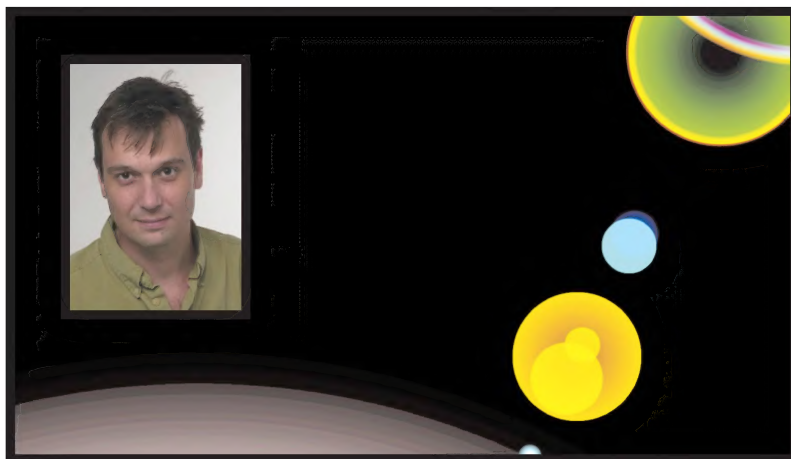
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Subscribing is the way of the future. Approximately 300 years ago the letterbox was invented, but only now is its full potential being realised! Imagine: once a month a new issue of atomic magically appears! All nicely plastic wrapped to protect it from bad weather and full of the good stuff that we know you love. It does sound rather good, eh! So, turn NOW to page 72.

editorial

## Remember when you thought LENS FLARE was cool?



When First Person Shooters arrived everything changed. The simple thrill of running around in fantastic, unreal worlds was an altogether new and wonderful experience. Each new FPS was jumped on by a reinvigorated gaming community, as well as an emerging, more specialised gaming subculture. We played every new 3D game, even Blood, Blood 2 and the Blood 2 mission pack. Anything 3D, no matter how stinky, because just being inside was good. Back then there was a new 3D game every six months, if we were lucky.

Now they're all over the shop. Everything is 3D – even strategy gaming has made an almost complete transition. It's all good. But, sadly, they all have the same feel. I'm well aware of the differences between a medieval dungeon and a 31st century starship, but what I'm talking about are the essential, basic limitations developers must work with and the resulting similarity between games. You know, the 'feel'. DirectX and OpenGL provide the features required to build a 3D game. But these features are also limitations. Developers can make a game look and feel any way they want – as long as they work within the 'feature sets' of the engine.

Flat, textured walls with textures that look like textures, pretty but unconvincing lighting and a bit of volumetric fog lying around the place if you're lucky, is what we currently expect. Quality architecture and texturing are all that make a game a graphical standout now. Every now and then some 'revolutionary' feature pops up, like Bump Mapping, FSAA or the legendary T-buffer, but their overall contribution is minimal to non-existent.

Everything has just changed. The nfiniteFX engine within the GeForce3 opens the gates of true creativity for developers. Now they can do just about anything they damn well please. The programmability of the nfiniteFX GPU, together with the new Vertex and Pixel Shaders, will allow virtually any effect within a game,

and when I say effect I mean that whatever, *whatever* the developers want you to be looking at on your screen. I'm imagining some pretty crazy shit as I write this, but I won't let you inside my bent brain here and now, instead we'll wait and see what sort of creativity developers are capable of.

Perhaps a new job description will emerge – a blend of artist and programmer? Neither are currently capable of exploiting the creative possibilities of working with a programmable GPU. Artists will have to learn to think outside the polygon, leaving behind forever the technical constraints imposed by current hardware, and returning, joyfully I expect, to unlimited creative expression. On the other side of the office, the coders will have to contribute quality creative input and keep figuring out ways to exploit this new power.

As always, the adoption of new technology by developers will seem slow to us, but it doesn't matter. Other graphics chip manufacturers will continue this path of innovation and NVIDIA can be relied upon to focus on the programmable GPU.

There's no going back and that's the good news.

Ben Mansill, Editor

# atomic

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news

» atomic CPL Pacific

## Short Circuits

◀ A new network specifically tailored towards the needs of gamers is about to be established in the US and Canada, promising to support the PC, Xbox, PS2 and GameCube. New Millennium Entertainment are promising that the gaming network will optimised to offer low latency and packet loss, and we wait with baited breath for an Australian based network created with the same goals in mind. It remains to be seen if the network will offer a significant improvement for online gaming.

◀ NASA have recently acquired a supercomputer that happily fits onto a desktop, as opposed to the hangar filling goliaths that are the norm. Utilising a Field Programmable Gate Array (FPGA) instead of a traditional CPU, this machine from Star Bridge Systems promises to shatter Moore's Law. If the technology works as advertised, it has the potential to deliver desk top computers up to 1000 times more powerful than current PCs. We'll keep you informed if this technology is as revolutionary as its creators are claiming, but we sure hope it's all true.

◀ It looks as if Senator Richard Alston is well on his way to making Australia the biggest joke on the Internet. New legislation is soon to be introduced that will ban any online gambling website hosted within Australia that is targeted at Australians. However, if the Site can prove that its customers are overseas, they can legally do business with them. Monitoring this will be a mammoth task, something Sen. Alston obviously didn't realise after reading "The Internet for Dummies".

# atomic CPL Pacific



The largest event of its kind in Australia, the Atomic Maximum Power CPL Pacific LAN was held in Melbourne over the weekend of the 30th of March to the 1st of April.

After some sponsors pulled out and it looked like the CPLP was on shaky ground, Atomic stepped in with sponsorship to ensure that the event finally gave a chance for the best of the country's Quake 3 and CounterStrike players to duke it out on a level playing field.

The venue at Flemington Racecourse looked like it had been built just for LAN events, with huge television screens and displays visible for all to watch the big matches and get the latest updates on the progression of teams throughout the intense competitions and events.

The Quake 3 duel competition featured not only Australia's best, but some top international players as well. The most hyped up of these players was US CPL competitor Fatal1ty, who shocked all of us cynical Aussies by showing that an upper echelon US Quake 3 player could actually be a top guy as well. Fatal1ty may have been the one getting interviewed by every newspaper in Melbourne, but Australia's hopes rested in Sydney based Python. After some tense qualifying rounds in the double elimination competition it came down to a playoff between Python and Elan from Korea for the chance to take on Fatal1ty in the final. These matches in all their low resolution/low detail glory were fantastic, and even melted the hearts of a few jaded anti-Quake gamers. In the end Elan won through

to the final, only to be beaten 19-15 by the undefeated Fatal1ty.

The CounterStrike competition had its fair share of hiccups, the most notable being a misunderstanding about the custom crosshairs being used by a member of ACT. This eventually got blown up into an international level message board fest about how they were caught cheating, an accusation the clan were aware of but unable to refute because of the lack of web access.

Hot favourites to take out the CS tournament were Melbourne based 12m. Their team stumbled however in the lead up to the finals, being defeated by DG and ending up in fourth place. DG then knocked out Brisbane based SAS to set up an all Sydney final (much to the delight of MPU organisers) with the undefeated dark horse clan of the event, Pantheon.

DG ended up losing to Pantheon on de\_nuke. Pantheon won as Terrorists 8-1 and then got into the unbeatable position of 2-0 as Counterterrorists to take the win. Congratulations go to Kalgo, Grim Chicken, Outbreak, Rase, BIGG-d and noetix for their convincing win.

All in all the tournaments were huge successes, settling several arguments over who is the best and reinforcing the fact that there are four or five clans could take out the CounterStrike tournament on a good day. With Python being the top placed Australian Quake 3 player and the Pantheon/DG CounterStrike final, the true winner of the weekend, was Sydney.

# Gaming - Good or bad?

In the space of two days we've seen two very prestigious offices on opposite sides of the world claiming very different views about computer games. On one side of the Atlantic, we have the Office of the Attorney General in the US saying that computer games contribute to youth crime and brutality in response to rising firearm related offenses in schools, while over in Old Blighty, the Home Office is saying that gaming makes you smarter and more employable. Like Highlander, there can only be one right answer.

John Ashcroft was appointed US Attorney General under some controversy, as he is considered to be quite the hardliner. Certainly, his assertions that computer gaming breeds an 'ethic if violence' in youth seem to point to someone very set in rather conservative views. School shootings seem to be multiplying like wildfire across the USA, and Ashcroft's commentary against gaming must be taken in that light - the US is at the moment a country stunned by the violence being committed against its youth by its youth. 'The entertainment industry, with its video games and the like, which sometimes literally teach shooting and all, we've got to ask ourselves how do we as a culture respond to be more responsible,' Ashcroft asked of his country during a television interview. Well, he may be Attorney General, but he sure ain't no great public speaker.

Sentence structure aside, what Ashcroft has to say is rather curious coming from a country where being

taught how to shoot by your father on idyllic hunting trips; or is Ashcroft saying that virtual weaponry is somehow more scary than the real thing?

In the UK, the Home Office is singing a different tune altogether. A recent review of around 20 studies into the longterm affects of gaming on youth in general has found that five years exposure to gaming is likely to leave someone smarter, more employable, and with a greater wage in a better job. Some of the studies, especially those dating back more than a decade, seem to suggest that gaming begets not only violence and aggression but also low self esteem and a greater likelihood of committing crimes. Jessica Harris, the Home Office researcher who undertook the review, however, has found that there is simply no basis in current evidence to suggest any of the negative claims.

And so we find ourselves with the dilemma of just what is going on - two such diametrically opposed views cannot both be correct. Apply Occam's Razor - the idea that simplest explanation is the best - and you're faced with paring away what it is that makes a British kid playing Doom less likely to go kill-crazy than his counterpart in the US.

Guns - simple really. Britain has had very strong gun control laws ever since a madman gunned down a bunch of schoolkids during the infamous Dunblane massacre in 1996. Even before then, however, it was never the same hotbed of maniacal firearm advocacy as the United States. The parallel can be drawn elsewhere, such as here in Australia, where we too have had our share of armed crazies on shooting sprees, but we've also dealt with the problem by tightening gun laws. And neither the UK nor Australia has ever had such an epidemic of schoolyard shootings by schoolkids themselves.

Gun laws alone are not the answer - any US gun nut will tell you that there are already thousands of laws on the books in the US restricting the control of firearms, but many of them can only be applied after the fact. The two Columbine High School shootists where braking a number of laws, but that didn't stop the tragic shootings.

Face it, kids all over the world get depressed over school, but not every child can sneak out to a gun trade show and pick up an assault rifle and a couple of pistols, or sneak them out from under daddy's bed. Computer games are not even close to the issue here.

## What's HOT

### Spanners

A great tool

### Black and White

Giant animals - the way of the future

### 133MHz FSB Athlons

A little FSB increase can go a long way

### Black Mobos

PCB moves into this century

### Coffee

Perfection at 96 degrees

### Us

We know who we are

## What's NOT

### Senator Richard Alston

A great tool

### Mechwarrior 4

Giant Robots are so last year

### 100MHz FSB Athlons

So new, so fast, yet already slipping behind

### Green Mobos

Seen one seen em all

### Beer

Perfection at 4 degrees

### Them

They know who they are



## news

» Game development for the budget conscious

Short  
Circuits

◀ The United Arab Emirates are obviously a very clever bunch of people. Not only do they control a large proportion of the world's oil resources, but they have recently done something the rest of the world should have done long ago - killed Pokemon! Any reference to Pokemon, be it a TV show, a Nintendo computer game or trading cards, is totally banned. Heck, even saying the P word is probably illegal. We're not sure what the punishment is, but being locked up with Pikachu for a week without human contact sounds good to us. A representative of the government was quoted as saying that Pokemon "possessed the minds" of children, but forgot to mention that it also bugged the crap out of everyone else.



◀ Another Web Site bites the dust. Hot on the heels of last month's announcement that the Australian branch of Gameloft had gone live, comes the shock news that the site is ceasing operations. Low advertising revenue has been cited as the cause of the site's death, making Australian Gameloft the most recent in a chain of disappointing Web Site closures.

◀ Nintendo have finally announced the price point for the eagerly anticipated Game Boy Advance, the latest in mobile gaming devices.. Coming in at the measly price of US\$99, this will hopefully translate to under AUD\$200 when it hits Australian shores.

## Game development for the budget conscious



So you've got a brilliant idea for a first person shooter, but can't quite scrape together the couple of million it will cost you for the license of a prominent 3D engine to build it with. Well, if you've got US\$100, you can now get hold of a modified version of the source

code of the Tribes 2 engine, known as the V12 engine. This is being distributed by the online software distribution company Garage Games, a group of ex-Dynamix employees who happen to have very strong links to Sierra. Of course there has to be a catch, as multi-million dollar engines don't usually go for less than the cost of a decent sound card. Actually, there are two major catches. The first is that the developer does not release a team based action game before the 15th of July, 2001. Obviously this is to stop the game from going into direct competition with Tribes 2. The second catch is that Garage Games have the sole rights to distributing your product. The majority of projects created with the V12 engine will be distributed freely from the Garage Games Web site, but if they can sell the game online the developer will receive a 50 per cent share of the royalties. If you happen to be the next John Carmack and create a game dazzling enough to get snatched up by a traditional software publisher such as EA or THQ, you get to keep a much larger share of 80 per cent of the royalties. We can't wait to see the projects that evolve as a result of this innovative approach to game publishing.

Massive bandwidth  
just around the corner?

A new world record has been set for transmitting data over an optical fibre. Using a process known as Dense Wavelength Division Multiplexing (DWDM), the research labs at Worldcom and Siemens have managed to squeeze 7.04Tbit/s (terabits per second) of data over a single 50 kilometre long optic fibre. The DWDM process, in effect, splits the one optic fibre into multiple channels, with each channel residing on a different light wavelength. 176 of these channels were created, each carrying 40Gbit/s of data, with the capacity for every channel to carry an individual stream of data. This equates to approximately 100 million simultaneous telephone calls all being carried by the one line. Compare this with the optic fibres in use today, which usually have a maximum of up to 32 separate wavelengths each carrying 10Gbit/s of data giving them a maximum throughput of 320Gbit/s.

133MHz FSB Athlon not  
happy on all 100MHz  
FSB motherboards

Some users who are trying to run the new 133MHz FSB Athlons on 100MHz FSB Socket A motherboards are reporting a major problems that results in them not being able to boot at all. It seems that certain motherboards that use the BIOS to set the multiplier, as opposed to hardware such as dip-switches or jumpers, will always use the CPUs default multiplier when booting until the BIOS has loaded. This means that if you have a 100MHz FSB 1GHz Athlon, with its default 10X multiplier, it will try to boot at a speed of 1.33GHz (10X 133MHz FSB). While the Athlon is renowned for being quite overclockable, this is simply to high a leap in clock speed for the higher speed Athlons to handle. There is a way around it by joining or disconnecting certain bridges on the CPU to change its default multiplier, but the best thing to do is purchase a motherboard that uses jumpers or dip switches for multiplier setting.





**ADVERTISING**

# Quantum Computing

David Petersen squints REALLY hard and looks into the future of computing

Back in 1936 a British mathematician by the name of Alan Turing published a paper that introduced the foundations of the digital computer. Although it was quite crude, using a long stream of tape with holes in it, the Turing machine paved the way for a technological revolution.

The computers that we use today are based on the Turing Theory using Boolean logic. Even the most advanced parallel computing techniques still employ complex Turing engines in their construction.

Boolean logic uses definitive binary states and represents 0 or 1. Other states can exist, such as during the transition from 0 to 1 or 1 to 0, but are not valid and unrecognisable by the processor or any other digital computer components. The valid states are referred to as bits and there are 8 bits to a byte. Quantum Computing can have three valid states, which are 1, 0 or both and are referred to as qubits.

Where an eight-bit digital computer can exist in only one of 256 states from 0 to 255 an eight-bit quantum computer can represent all 256 states at the same time and in theory can work on 256 calculations at once. This technique is referred to with the term quantum parallelism.

With digital processing each of the 256 numbers have the same probability of being measured at output, however, a quantum processor can represent all 256 states but still have a single measurement at output.

While a classical computer would need to pass through all 256 possible measurements a quantum computer only requires one processor pass. This dramatically reduces the processing time for calculations and a simple 10-bit quantum computer would blitz today's fastest supercomputers.

While this sounds good in theory it is much harder to put into practice. Qubits are extremely difficult to produce and must be undisturbed by any outside interference. When disturbed the qubit becomes unstable and will select a definite state and become more digital than quantum-like.

In order for a quantum computer to do anything useful it requires thousands of qubits to act in co-operation, or decoherence, with each other. If any one of the qubits are disturbed the outcome can become unreliable.

In 1981 Paul Benioff of Argonne National Laboratory first applied quantum theory to computers and in 1985 David Deutsch of Oxford proposed quantum parallel computing. It wasn't until 1995 that the first realisation of qubits started to emerge. Researchers at the Institute of Standards in Boulder,

Colorado, trapped a single atom with missing electrons (an ion) with two energy levels by containing it with magnetic and electric fields at a temperature of 273 degrees C.

Qubits can also be made from polarized light, by allowing photons to interact with each other as they pass through a stream of cesium atoms creating an XOR-like gate.

And at the Los Alamos Laboratory ions have been trapped housing up to six at a time; however, this was far short of the thousands needed to create a working quantum computer.

One of the major centres behind research into Quantum Computing is based here in Australia at the University of NSW, with co-operation from the University of Queensland and the University of Melbourne. The research centre works in collaboration with the Los Alamos facility and is looking at embedding qubits in phosphorus nuclei to create quantum computers.

Finding real applications for quantum computers may also prove difficult, as they are not practical for all applications.

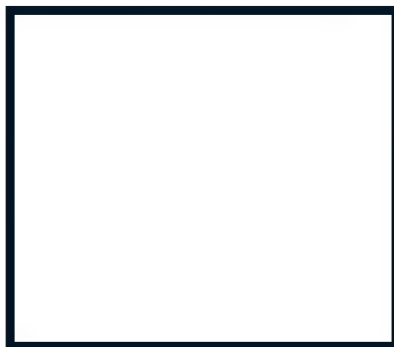
Quantum Computing has enormous potential in high-level encryption as this field hinges on how hard it is to find prime numbers.

A conventional computer would have to check all possibilities until it finds the right combination, however, a quantum computer can check all possibilities at once.

Codes that would take a conventional computer years to decrypt would take days on a quantum computer. The crux is that a quantum computer can have one right answer emerge out of all possibly wrong answers in one processor pass, making them extremely fast when compared to current technology.

To date the reality of quantum computers is still science fiction and there are plenty of scientists arguing that it is in fact impossible.

Whatever the outcome don't expect to see quantum computers on your desktop in the near future. We may not see the first real applications of Quantum Computing before the year 2020, so the copper-wired, silicon-transistor based, digital computers still have a few decades of life left in them. □



Above: Atoms (actual size)

# V1.0 Victims

Dan Rutter is victimised



they buy the same widget actually, often, don't buy the same widget. They get the superior v2.0. Or a different-but-similar widget that works better.

A lot of people who managed to resist the urge to spend big bucks on a GeForce2 GTS, for instance, ended up buying a GeForce2 MX instead. Very similar core, slower memory, much cheaper. And very nearly as good as the GTS if you don't have a huge monitor; ultra-fast RAM only really matters in very high resolutions.

Consider, also, the frantic charge by the wallet-brandishing forces of the Queen's Own Early Adopters to get themselves a Pentium 4. Not much of a charge, I grant you, because much cheaper P-III and Athlon systems give the P4 a serious run for its money for desktop computer tasks. But those that have bought an early P4 have a motherboard and processor using the Socket 423 interface, known to its friends as PGA423.

When Intel rolls out the "Northwood" P4, they're going to switch to Socket 478, also known as mPGA478. Northwood will be able to run faster and cooler than the original P4, but unless someone gets very clever and creates an adapter, you'll need another whole new motherboard.

The standard P4's supposed to be able to make it to 2GHz, but Intel said the P-III could make it to 1.13GHz, too, and that sure blew up in their faces. They launched the chip in July 2000 and recalled it a month later when it became clear that the bloomin' thing didn't work reliably.

Whether Intel can hit their P4 roadmap targets is a matter for rather boring debate, but even if they do, 2GHz is probably the fastest P4 you're ever going to plug into a Socket 423 motherboard. Then, it's Northwood all the way.

AMD CPU users aren't exempt from this sort of thing either. I'm writing this on a 700MHz Athlon-powered machine, but it's a Slot A CPU, and I can't upgrade it.

**"The down side, of course, is that the reason things get cheaper so fast is that newer and better things keep coming out."**

One of the best, and one of the worst, things about computer hardware is that it depreciates about as fast as prawns. Don't like that price tag? Come back next month, it'll be lower. Never mind the exchange rates; overall, prices fall, and you never have to wait long for it to happen.

The down side, of course, is that the reason things get cheaper so fast is that newer and better things keep coming out. It's an arms race. And so PC hardware buyers have to trade off techno-lust against financial probity.

Buy a GeForce2 GTS graphics card when they were brand new, and you paid the princely sum of \$700. Buy one a year later, and you pay \$450.

There's another reason to buy things later, rather than sooner, though.

Hopping on the new-technology bandwagon at the first opportunity often leaves you with v1.0 of whatever the widget is. People who elect to save money by waiting a year before

The original 1GHz Athlon was Slot A, and there are 1.3GHz Athlons on the market now. But they're Socket A. AMD have almost completely phased out Slot A, and there's no "slotket" adapter to use the newer CPUs on the older motherboards.

Examples of this sort of thing are rife throughout PC history. There are still plenty of P-II computers around, for instance, that were bought when the P-II was the hot new thing (and, like the P4, not actually very good value for money). They have early AGP-and-USB motherboards which can't use any half-decent 3D card, because the AGP voltage regulator's not beefy enough.

Buy later, buy cheaper, buy better.

Now you'll have to excuse me. A nice man from the ad sales department's turned up with a cricket bat, for some reason. □



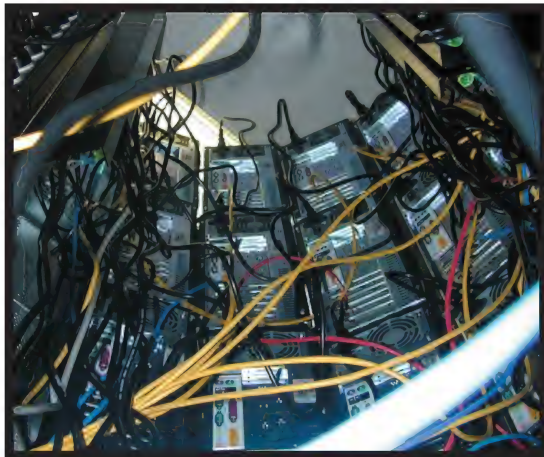
# AMD Beowulf Cluster

Kim Branson of the CSIRO Health Science and Nutrition and The Walter and Eliza Hall Institute of Medical Research explains why sixty-four 1GHz Athlons are bare minimum.



① The completed array. The tubular design was selected for airflow advantages. Note the lack of any floppy or CD drives

①\* Inside the cluster. Only power and network cables are needed



## What are the system specifications and total cost of the computer?

The Caduceus cluster consists of 64 nodes linked by 100Mbit fast Ethernet using a 72-port HP Procurve 4000m Switch. Each node consists of a 1GHz AMD Athlon CPU, 64MB of 133MHz SDRAM (64MB is all that is required for the application) with a 20GB IBM IDE HDD mounted on an ASUS A7PRO motherboard. The link from the switch to the head of the cluster is a channel bonded dual fast Ethernet card acting as a single 200Mbit link. The head node is a 900MHz Athlon with 30GB and 60GB IBM IDE HDD, SCSI CD burner, DVD Drive, 512MB 133mhz RAM, GeForce2 GTS and 3 Ethernet

cards. The machine cost about \$64,000 dollars to build but its total value is about \$188,000.

## Why did you build the machine and what will it be used for? Why did you choose the Beowulf Cluster configuration?

The machine was built to solve a particular problem; the discovery of potential drugs by computational means. The problem is best viewed as a three dimensional jigsaw puzzle. Caduceus looks for a small molecule that will fit exactly into a protein pocket. The computer systematically tries to fit each small molecule from a database of millions of small molecules. This task is particularly suited to parallel computation. You can consider each small molecule-fitting problem as a separate calculation and therefore run each calculation on a separate CPU. This means I can run 64 jobs at once. The other calculation, molecular dynamics, uses all the CPUs as one giant system. So to solve this problem we needed a multi-CPU system, but because conventional multi-CPU systems are so expensive we decided to build our own. Beowulf is just a name given to cluster (multi-CPU) systems built from readily-available, commercial, off-the-shelf components.

## Why did you decide to use AMD processors, and has this presented any heat dissipation challenges?

I decided to use AMD Athlons because I can fit the entire application into the L2 cache on the chip. This 512KB of L2 cache allows the application to run at nearly clock speed as there is no slow-down due to fetching in and out from memory or hard disk etc.

The Athlons have three floating-point pipelines compared to the single one on a Pentium processor, so in terms of maths performance it is a lot better. I've also used some of the 3DNOW! extensions in my code for greater performance. In terms of heating, the cluster is in an old air-conditioned mainframe room. Cool air blows up the middle of the cluster and the nodes take air in from the outside and blow into the core. Athlons and Pentiums have very similar heating issues. When you have so many CPUs in such a small space you need to consider the heat dissipation during the design process.



### How about a simple (if there is such a thing!) explanation of the Beowulf Cluster design?

There sure is, it is essentially a group of nodes connected by some form of networking to a central master node. The hardware changes depending on the application, but each node usually has a CPU, networking and memory (diskless nodes are possible, it all depends on the application). A Beowulf cluster is about performance per price and each one is usually designed for a specific application.

Check out [www.beowulf.org](http://www.beowulf.org)

### Advantages and disadvantages of the parallel design?

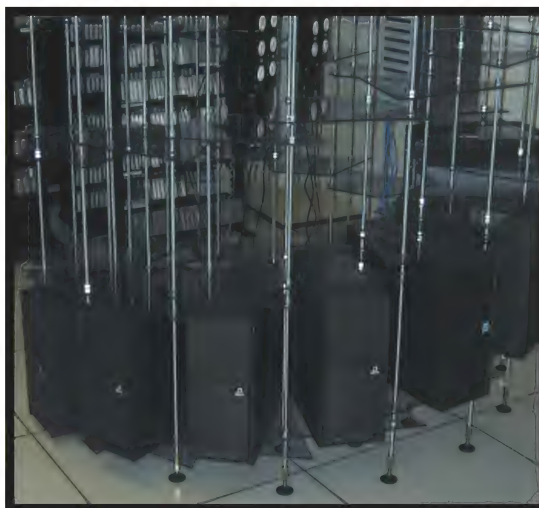
Advantages many, we get perfect scaling for our main application and quite good scaling for the other application. Disadvantages none; you simply couldn't do this without using a parallel system.

### What software will be running on the machine?

We use Linux. RedHat is our distribution, with Enfuzion by TurboLinux as our job dispatch and scheduling system.

### How long do you see the machine being used for? Can you upgrade the CPUs or other components to extend the machine's life?

It's one of those things that will continue for years, but the life of a node will be 12 months at best before it gets replaced. Due to the nature of the system it can have nodes gradually replaced while the essential network remains unchanged. We plan to change CPUs as soon as dual Athlon boards come out later and double our CPU number. We will probably change to DDR RAM too.



① The individual PCs during assembly and testing

② Installing the boxes in the custom rack



③ The custom frame. A thing of beauty too. Anyone remember the platform jumping level in MDK?



## Short Circuits

◀ Much to our surprise, Sony have accomplished their goal of shipping 10 million PS2 units before the close of the financial year. Considering the shortage of units Sony complained of during the launch of the console, it's amazing that Sony still managed to reach this initial goal. Or could it be that Sony's marketing department created this 'hardware shortage' to further whip up the buying frenzy for a console that didn't have enough titles ready for the launch?

◀ If the place where you want to go today happens to be somewhere on the Internet, you might want to try out Microsoft's new beta version of Internet Explorer 6. This has been released for testing to the general public, and incorporates additional features for the manipulation of digital images, music and video clips, plus other enhancements. All we want to know is how stable and secure it is. Our advice to you is to hold off for the final release until more is known about this latest version.

◀ VIA's successor to the Samuel II, the Ezra, should be shipping in test form in the next month. Debuting at 1GHz up to 1.2GHz, it will ship with 128KB of L1 cache. The total amount of L2 cache hasn't been announced yet, which bodes ill. It will still be based upon the same architecture of the Samuel series, but at clock speeds this high the chip might finally have the oomph it needs to take on the Duron and Celeron. The chip is going to be targeted at the same value sector that the original Samuel's were aimed at, so we aren't expecting Athlon beating performance.

# Benchmarking to the MAX



This month has seen us spending a considerable amount of time in the Labs gaping and leering at the latest 3D benchmarking utility from that crazy vegetable developer, MadOnion, the mighty new 3DMark2001. And, to tell you the truth, half the pleasure in watching 3DMark2001 go through its paces was in knowing that we don't have to watch that damn helicopter fly over those damn mountains any more (yes, we liked the helicopters when they first came out, and yes, we know we will be sick of 2001 before long too, but let us have our one moment of respite). Two things that especially caught our attention were the Nature test, which truly has to be seen to be believed, and the amazing texture of Max's leather overcoat during the Lobby test, which actually looks like real leather, and is not just the usual smooth-textured, gouraud shaded surface.

3DMark2001 includes a host of funky new features, and like 3DMark2000, it is also based on the MAX-FX engine, from Remedy Entertainment, which will be powering the upcoming, and much anticipated (even more so after 3DMark2001's release) Max Payne. One of the primary features of 3DMark2001 is its foundation in Microsoft's DirectX 8. This means that it supports many of the new GeForce3 features, like the Vertex and Pixel Shaders, as well as the 'Quincunx' FSAA (Full Scene Anti Aliasing) method. The benchmark can run in one of three modes: pure Direct3D hardware, where the graphics card does all T&L (Transform and Lighting) calculations, including pixel and vertex shader calculations; Direct3D hardware, where the 'traditional' T&L engines from chips like the GeForce256, GeForce2, ATI Radeon and S3 Savage2000 are used for T&L, but vertex shading is done by the CPU; and Direct3D software for cards without any hardware T&L. 3DMark2001 includes four game-type tests, compared to 3DMark2000's two game tests, although one of the four tests, the Nature Test, is DirectX 8 only, and at the moment will only run on a GeForce3.

Not all is heaven with 3DMark2001, however, and we did notice a few anomalies during testing. There appear to be a few bugs still in the code, and we wouldn't be surprised to see

a patch out some time soon, as happened with 3DMark2000. There are also some driver and DirectX 8 issues that seem to be out of MadOnion's control, meaning some users will have to wait for new drivers or a DirectX update before getting the right results out of the benchmark.

The test also incorporates the results from the Nature test in the overall score, meaning that GeForce3 cards get an immediate advantage over other non-DirectX 8 cards. This means that you cannot make apples with apples comparisons between the GeForce3 and older cards like the GeForce2 and ATI Radeon.

Finally, don't forget to check the atomic MPC Web page for the latest results that ourselves and you guys out there are getting. If you want your own scores included online, just email the result file for the default test along with your name and system details into our Online Editor, David Hollingworth, at [dhollingworth@atomicmcp.com.au](mailto:dhollingworth@atomicmcp.com.au).





**ADVERTISING**

Short  
Circuits

## ◀ S3 lives

Once giant of the graphics chip industry, S3, went through a tumultuous 2000, ending in a name change to SonicBlue, and entering into a partnership with Taiwan semiconductor giant, VIA, to create S3 Graphics. S3 Graphics now specialises in providing graphics technology to VIA for incorporation into chipsets, although there is nothing saying that S3 Graphics won't release a stand-alone graphics card in the future. Besides the ProSavage, based on the S3 Savage4 core, and integrated into the KT133 chipset to produce the KM133, the latest product from S3 Graphics is the SuperSavage. This mobile graphics chip is based on a 128-bit 143MHz core, had dual texturing pipelines and can support 128-bit SDRAM or 64-bit DDR RAM, and should provide a significant boost to 3D performance in notebook PCs.

[www.via.com.tw](http://www.via.com.tw)

## ◀ Harsh equality

Well, it has finally happened – a virus that can infect both Windows and Linux. The virus, called W32.Winux, is coded in low-level assembler language, which means that even though both OSes use different code, they are both vulnerable. The virus doesn't appear to be dangerous, but it sets a precedent and could be just the beginning of cross-platform viruses, that could get particularly nasty for Windows officianados and Linux monkeys alike. In fact, perhaps Linux users should feel proud and chuffed that the open source OS is now considered important enough to be bundled together with a Windows virus – or is that an insult? We'll let you be the judge.

## Processed cheese



1GHz fury in a portable package

Intel is absolutely fixated on Moore's Law (the one that states that computing power - which has been interpreted as being CPU speed, the number of transistors in a microprocessor or the gate speed of microprocessor transistors), and Intel is determined to keep that ambitious target in its sights. Intel's goal is to shrink transistor size by 30 per cent every two years. Process shrinking is a good thing, since it increases the number of CPUs derived from each wafer, which in turn reduces cost per processor and it has the added advantages of reducing the heat produced during operation by lowering electrical resistance across the transistors. The ideal is a processor that has a high drive current, which allows faster communication between transistors, a smaller die size and a low operating voltage.

Intel will be moving to a 0.13-micron process this year for its Tualatin processor, and

will be subsequently shrinking its process even further over coming years. The current process is called P858, at 0.18-microns, the next is P860 at 0.13-microns, then in 2003 is the P1262 process at 0.10-micron and finally in 2005 Intel expects to be running on the P1264 process at an amazing 0.07-microns, with a minimum gate size of 0.03-microns. The P1264 process should allow processors to hit the 10GHz mark.

The only thing we are worried about here is when the 2.4GHz processor is released, since that is the frequency that microwave ovens operate at. Imagine, playing a game and cooking your dinner at the same time...

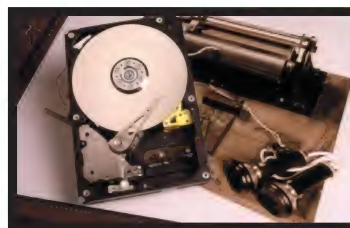
In other interesting Intel news, the i845 chipset should be available for the Pentium 4 this year, although Intel fully expects it to perform below the level of i840 RDRAM-equipped systems. Given this, it seems apparent that Intel's motivation for developing the chipset is purely to placate the anti-RDRAM masses. This is confirmed by Intel's Asia Pacific Desktop Platform Regional Marketing Manager, Jeff Krisa's, claim that Intel is firmly 'memory agnostic', and is dedicated to bringing the most price/performance effective memory options to its customers.

The 1GHz mobile Pentium III is also out now, bringing some serious computing power to users on the move. The Pentium III will have to suffice for notebook systems for some time though, since due to its size, complexity and the sheer amount of heat it generates, there will be no mobile Pentium 4 until sometime in 2002.

[www.intel.com](http://www.intel.com)

## Hot and Hard

This month Adaptec and IBM announced plans to work in conjunction on testing of the new Ultra320 SCSI technology, including drives and adapters, and Seagate has already



demonstrated a drive using the standard. Ultra320 will succeed the current max SCSI standard of Ultra160, and will theoretically provide 320MB/sec transfer rates. Wow.

This doesn't mean a hell of a lot to gamers, but it ups the bar another notch in terms of hard disk speed, which has long

been an increasingly large bottleneck in system performance over a wide range of applications, especially things like non-linear editing of audio and video. With 15,000rpm drives increasing in popularity, and even solid state drives beginning to seep into the market, it all means that maybe, one day, mass storage will be able to keep up with the rest of your PC. Let's hope.

[www.adaptec.com](http://www.adaptec.com)

&gt; MP3s are dead! Long live MP3s!

Z-access

# MP3s are dead! Long live MP3s!



Gnutella: Sweet, sweet file sharing

As Napster's days are numbered, many people are floundering around looking for some kind of alternative for their MP3 and file 'sharing'. Contrary to the hype, the death of Napster would not mean the death of MP3s, or even the sharing of any types of files over the Internet. There are plenty of options out there, one of the most popular being Gnutella.

Gnutella is an open source file sharing system that is completely unregulated, decentralised and is immensely powerful. Instead of just sharing MP3s, like Napster, it can be used to share any type of file you can think of, with any format, any size and

potentially on any OS. The original Gnutella (version 0.56) was released by Nullsoft, a division of AOL, back in March of 2000, although distribution online by Nullsoft ceased within a day - some have even said that the original release was a 'leak' and was never even intended to go out to the online public at all. Gnutella is not just that application, however, it is also a protocol for file sharing that can be used by any number of Gnutella-based clones.

Since it is open source, anyone can create a Gnutella clone and can distribute it freely. This also means that, unlike Napster, there is no one individual or body that can be held responsible for the network. There is just about no way to regulate Gnutella, or to stop file sharing over the network. This could have dramatic implications on copyright issues, and it should be interesting to see how industries such as music, software and movies react to the inevitability of file sharing.  
[gnutella.wego.com](http://gnutella.wego.com)

## World War 2.1

Massively multiplayer online gaming has garnered so much attention recently that you would think that there isn't much that hasn't been tried. Then along comes a game and supporting community so incredible that it sets a new standard in the meaning of massively multiplayer gaming.

A relatively small (compared to behemoths like Everquest or Ultima Online), but ever growing, community of fans of the WWII wargame, Combat Mission, hope to recreate one week of the fighting during a turning point in the western front campaign in August of 1944 in the Combat Mission Meta Campaign (CMMC). There are realistic orders of battle, including everything from infantry to full armoured divisions, with each player taking on a staff or battalion command with a team of GMs that arbitrate the player's battles. Using the built-in map and mission editor, a massive portion of the western front has been accurately recreated in-game based on actual WWII strategic maps. Fog of war, chain of command, artillery, intelligence and



CMMC: A pair of PzKpfw V Panthers on patrol.

supply are all factored in, making for a very realistic wargaming experience. The community response to the trial campaign, called the Command Post Exercise, was outstanding. So, will the Germans defy history and push the Allies back into the sea, or will the Allies repeat their efforts of over half a century ago and drive the Germans before them? Only time will tell.  
[www.combatmission.com](http://www.combatmission.com)

## Short Circuits

◀ Serious production of the heart of the GameCube has begun, known as the Flipper. Nintendo decided against manufacturing the chip in-house and have outsourced the job to NEC, who are building the chips at its new 8,000 square metre facility.

◀ In case you hadn't noticed, CounterStrike v1.1 has been released. Adding support for 512 x 512 resolution textures, the mod is looking sexier than ever. The other major change to the mod is the lowering of weapon accuracy when jumping. Hopefully this will put to an end the bunny hopping head shot tactic many have exploited in the past. Head over to [www.counter-strike.net](http://www.counter-strike.net) to grab this latest iteration of the world's most popular online first person shooter.

◀ The Aussie dollar has been having a rough time of late. Falling to record lows of below US50 cents has had a major impact on our nation's businesses. Not least of those who are feeling the hurt is the personal computing industry. The vast majority of computing goods are imported into Australia, so the recent drop of the dollar has translated to higher costs of hardware within our country.

◀ Now that Sega have decided to move from hardware to software production, which platform are they going to focus on? The recent announcement that Sega are going to develop 11 games for the Xbox sends a pretty clear signal that they're placing a lot of their eggs into Microsoft's basket. With such a renowned software company jumping aboard the Xbox ship, we can't imagine how the console can fail.



**ADVERTISING**





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hot box

&gt; Best of atomic readers' case mods

# Builders: Luke and Zak St Clair

5 year old Zak built this plaything, with just a little help from Dad



## technical details

- Celeron 600 @ 754
- 512 ECC Parity RAM 2 x 256MB
- 2 x 15GB 7200 RPM IBM HDDs
- Hercules GeForce256 DDR
- Asus CUSL2 motherboard
- SoundBlaster Live!
- 48 x AOpen CD ROM
- Asus iPanel
- 2 additional case fans
- Super Orb CPU HSF
- Blue Orb Graphics GPU HSF

## cool bits

- Translucent motherboard Northbridge fan
- Green wire cover from car parts shop
- Clear plastic tubing for wire cover
- Clear side panel and suck hole

## The Story

I've been modding my mates cases for raves and gigs for a while now. So the tools and setup were all in place, and I'd reached the point where I pretty much knew what I was doing.

Having a 5 year old son (Zak) who plays games with me and loves computers, I thought we would make him something we could show off at our regular monthly LAN party. We had about four spare cases to choose from and Zak picked this one because he like the blue.

It didn't have to be too powerful, just look nice for him, being that the second home machine had to be kept to a budget. So a Celery 600 o'clocked to 809 was selected for good value. Inside are some spare hard drives and last year's pre-loved Hercules GeForce, 512MB RAM from an old server and Zak had himself a good gaming machine.

It was great fun building this machine together, having someone to pass me tools and help hold bits and pieces was great, and driving around one Saturday morning to find all the parts we needed was fun too.

The inspiration came from seeing the first edition of atomic. I thought it was time to get serious and I'm glad we did. A light inside and a few POKEMON stickers and we're complete! And very happy with the finished product.

We have plans for a Pickachu case soon and maybe something special for Mum as well!

The idea was to make a small case look spacious and create good air flow through tidy neat wiring

Thanks Zak and atomic!



The best of atomic readers' custom cases. A 12 month subscription for each month's WINNERS

Best of atomic readers' case mods

hot box

# Builder: Killer

This slim black box exists purely as an mp3 player

front elevation

back elevation

side elevation



## technical details

- Win 98 SE
- Via VX motherboard
- 166MHz MMX CPU
- 64MB RAM
- 10GB HDD
- 250MB Zip drive for transferring mp3s
- 16 bit sound card
- 2MB PCI VGA card
- 150 watt power supply
- Extra cooling fan
- Perspex top
- WinAmp with plug-ins

## The Story

I've always had a dedicated mp3 server, but they were always towers that took up too much space, used far more electricity than was necessary and generated more heat in a small room. Because I work from home, it's always on with a huge playlist of favs, (no crap elevator music!).

One work day I was at a local computer supplier and saw the mini case, I liked the size and the low wattage power supply, it made it ideal for the purpose.

The trick was getting the bare minimum of hardware to fit into such a small case. Going through all my spare motherboards in the garage, I found one that had the CPU and memory slots in just the right places.

I completely stripped the case and frame apart, cutting a cooling hole in the side and adding a high power CPU fan and grill cover.

Then, using two shades of grey automotive interior vinyl paint, went to work colour co-ordinating the case and face. The frame and inner case got a coat of black gloss enamel spray paint.

Only having two smaller bays to work with, I decided on a HDD and a 250MB Zip drive for the mp3s.

With a few goes it worked out well. Small, quiet and cost effective. The machine plays a long list mp3s, 24 hours a day, as well as entertainment for LAN parties.

Proud of your hot box? Send a low-res pic of the front and side to [hotbox@atomicmpc.com.au](mailto:hotbox@atomicmpc.com.au). We'll be in touch if we like what we see.



head to head ≥ DVD vs VCD vs DivX ;-)

# DVD vs VCD vs DivX ;-)

David Kidds examines three of the most popular video formats for the PC, and tells which is the most appropriate for you



① High action  
DVD still  
(720x578)

② Low action  
DVD still  
(720x578)

The PC is becoming more than just an ugly little box that sits in the corner of the room. It's potential is becoming recognised by a wider audience, allowing for a more central role and even, possibly, maybe: living room status. As home entertainment rushes toward digital data streams it makes sense to see computers in the centre of this development. Take a look at the amount of digital speaker sets and accompanying sound cards currently available and it becomes clear that the role of the computer is going through a definite and undeniable change. In tandem

to audio capability, video is undergoing a harsh break-up from its analogue origins. Video CDs and DVDs are slowly reducing the shelf space of the mighty VHS, although not until VCD and DVD can produce affordable and convenient back up capability will the VHS roll over and die. Over the last few years the video industry has seen another contender creep in through the back door. DivX ;-), with the emoticon included, has been labelled the MP3 of video by combining the Internet with compressed high-quality video, cementing the DVD as a luxury product.



⇒ DVD vs VCD vs DivX :-)

## head to head



### MPEG

The video standard being used in all three cases is MPEG. The Motion Picture Entertainment Group is responsible for setting the standard in compressed video with VCD and DVD using MPEG 1 and MPEG 2 respectively. Developed early last decade MPEG 1 and 2 have a solid foundation and have been used effectively in computer and portable media. DivX :-) uses the new MPEG 4 standard combined with MP3 audio. In order to digital represent images to the

same quality as analogue, enormously large storage and data transfer are required. Without a form of video compression, one DVD will hold about 10 minutes of video. MPEG is able to compress images to be displayed in real time or broadcast over a distance. By using techniques that predict frames based on motion and removing redundant 'scenes', like an unchanging background, the video stream is able to effectively display the picture at 25fps while our eyes are none the wiser.

① High action VCD still (352x288) from the same scene as the high action DVD still on the opposing page



### VCD

While not hugely popular in Australia, the VCD has a large international cult following overseas due to its VHS-like quality and cheap production. Using the MPEG 1 format, the VCD simply displays the image in a linear progression usually without 'tracks' or menus. Anyone with a burner and source material can easily create a VCD and before you know it you'll be selling them at the local Asian grocery store. Technically, the VCD is nothing special. Storing about 70mins of video and audio on a standard CD the resolution sits at 352 x 288 at 25 fps for PAL and 352 x 240 at 29.97 fps for NTSC. Stereo audio is

① Low action VCD still (352x288) from the same scene as the Low action DVD still on the opposing page

## head to head > DVD vs VCD vs DivX :-)

available though you'll often find the left and right channels signify an audio soundtrack (i.e. Mandarin on the right channel and Cantonese on the left).

Aside from cheap production, the VCD can be played on a wide range of systems. Any PC can play a VCD provided you have the software while dedicated VCD machines can also be used which plug into a standard television. All DVD players will play VCDs while specific adapters are available for the Playstation or Nintendo 64. Portable VCD units with LCD screens top off this diverse range of platforms.

Developed by the Chinese government to skirt international DVD royalties the Super VCD is a large improvement over the standard VCD. As well lifting national pride, the SVCD uses the MPEG 2 format with surround sound support, providing near DVD quality video and audio.

### DVD

Steadily gaining in popularity, DVD slapped VHS around in terms of video, audio and functions.

The DVD uses MPEG 2 encoding which is basically an extension of the MPEG 1 instruction set. At lower bit rates MPEG 2 holds little advantage over MPEG 1 in terms of straight video quality yet offers smooth, high quality pictures at higher bit rates.

An important advantage that the DVD provides over VCD is Variable Bit Rate support (VBR). VCDs use Constant Bit Rate (CBR) which use a specified bit rate to produce every video picture. So, when viewing high action video scenes (i.e. rapid movement with little or no static elements) the visual quality would decrease due to the set bit rate. The VBR on the other hand will use a low bit rate on slow, low action scenes and high bit rates for high action moments. This allows for consistent high quality video throughout the sequence. Averaging at approximately 4.7 Mb/s, the maximum bit rate on a standard DVD is approximately 9.8 Mb/s, while the VCD sits at 1.15 Mb/s. The available resolution set in the DVD standard is also above the VCD at 720 x 578/480 for PAL/NTSC. Like the VCD, the PAL format displays 25 frames per second while NTSC displays 30.

This, combined with the large physical storage of DVDs allows for high quality digital video and audio to be streamed in real time to a television set. After adding on interactive menus, subtitles, and soundtracks the DVD is clearly the top end of video, firmly set as a luxury item.

### DivX :-)

First of all lets clear up some confusion that surrounds the name. For whatever reason DivX :-| shares its name with another form of digital video called DIVX. The latter is now a defunct service, which aimed at providing a 'rental' DVD with a 48-hour viewing window. Expensive, confusing, and complicated hardware put the DIVX on the island for idiotic corporate inventions that has no consumer benefit. So, with emoticon intact we have a funny little joke combined with a versatile codec, which produces high quality video rips and low storage.

DivX :-| is a hacked version of Windows Media Player, which allows video to be output as .AVI rather than .ASF. DivX :-| uses MPEG 4 compression, which allows for high quality and low bit rate video. Contrary to what many believe, a DivX :-| video does not have better video quality than MPEG 2 and as such poses little threat to DVD. While the DVD produces high quality video at high bit rates, the DivX :-| produces high quality at lower bit rates. At the top end, say 6-9Mb/s the DivX :-| cannot compare to the quality of a DVD sequence.

Due to its excellence at low bit rate sequences MPEG 4 was designed for situations where low bandwidth and storage is available, making it suitable for broadcasting or mobile users. To give a sense of the compression rate a typical DivX :-| recorded at 640 x 480 can store up to 90 minutes on 650MB.

There is no standard for DivX :-| video and as such, nothing will play it aside from a PC. This seriously effects the application of DivX :-| as a strong competitor to the DVD and even the VCD.

### Conclusion

All three formats discussed here offer their own set of advantages, which gives us no clear-cut winner. In terms of video quality and features, the DVD is unbeatable. The other formats cannot compare however to the versatility and platforms available to the VCD while the Super VCD combines all this with high quality video. Finally, we have the DivX :-| bad boy offering considerably high quality with low storage but without dedicated hardware and standards. The continuing interest in all three video formats is a lesson to the increasingly competitive industry of digital video where quality, accessibility, and distribution need to be addressed together to gain any real advantage. □

VCD Tech Info		DivX :-	DVD Tech Info
Format:	MPEG 1/ Layer 2	MPEG 4	MPEG 2/Layer 2
Video Bit rate:	1.15 Mb/s; Constant Bit Rate	Variable or Constant	9.8 Mb/s; Variable or Constant Bit Rate
Resolution:	352 x 288/240 PAL/NTSC	Variable	720 x 578/480 for PAL/NTSC
FPS:	25/29.97 – PAL/NTSC	Variable	FPS: 25/29.97 – PAL/NTSC
Storage:	Video CD 1.0/2.0 compatible	PC only	DVD Video
Audio:	Two-channel stereo	MP3	Stereo, Dolby Digital, and DTS





**ADVERTISING**

x-ray

≥ DDR - How it works

# DDR - How it works

Simon Peppercorn gives us the lowdown on the one notched wonder that is DDR-RAM

DDR - memory has actually been around for a while. The first chipsets that used Double Data Rate technology were used in graphics subsystems. More recently it has been developed for use as system memory, and has become the next step in the evolutionary process of RAM modules.

Just to provide some context, we will mention a little about some of the previous stages in the development of memory technology.

FPM RAM (Fast Page Mode) allowed several bits of data in a single row on a DRAM to be accessed at an accelerated rate. Fast Page Mode involves the selection of multiple column addresses, in rapid succession, once the row address has been selected.

From FPM RAM there was a rather clumsy

transferred in the same amount of time.

Existing PC-100 memory has a maximum bandwidth of around 800MB/s and PC-133 memory achieves up to 1050MB/s. Because, as we said, DDR doubles the amount of data throughput, you can achieve data speeds of up to 1600Mb/s for 100MHz memory and 2100MB/s for 133MHz memory are possible.

The DDR naming conventions used are designed to illustrate the maximum achievable bandwidth. In other words PC-1600 is the equivalent of DDR-200 (double PC-100) and its name shows that the module is capable of 1600 MB/s. Accordingly PC-2100 is equal to DDR-266 (Double PC-133) and can reach speeds of 2100MB/s.

**“Unless you are using applications that are very memory bandwidth intensive, PC-1600 probably won't create any noticeable improvements at all”**

progression to EDO RAM (Extended Data Out). With a 2-stage pipeline, the memory controller could read the data off the chip at the same time as the chip was being reset for its next operation. EDO did not support bus speed above 66MHz.

100MHz SDRAM started to emerge and by the end of 1998 was becoming a standard for desktop PCs. However, due to the rapid developments in CPU speeds and the enhancements to AGP graphics subsystems, it was important that memory technologies kept pace.

The advancement in memory technology to DDR is an important one because the existing DRAM architectures had almost reached that critical point of the bus width and operating frequencies being at their maximum achievable limits.

Technically speaking, DDR-SDRAM is no faster than its predecessor, SDRAM. Essentially, DDR-SDRAM is a souped-up version of SDRAM in that it has twice as much available bandwidth while still maintaining the same clock speed. This feat is achieved by allowing the transfer of data on both the rising and falling edges of the clock signal, instead of (in the case of SDRAM) just the rising edge. In other words, DDR-SDRAM still runs at the same speed, but moves double the amount of data than SDRAM is capable of moving.

## Comparing SD-RAM to DDR-RAM...

SD-RAM moves one piece of data per rising edge of the clock cycle, but DDR-RAM moves data on both the rise and fall, doubling the amount of data

Usually CAS (Column Address Select) latency for SD-RAM is either 2 clock cycles or 3 clock cycles. However DDR-SDRAM has a CAS latency of either 2 clock cycles or most commonly 2.5 clock cycles.

Don't go thinking that this is going to double your overall system speed. It will only double your memory bandwidth. Depending on the other bottlenecks in your system you can expect realistic performance gains of around 10 to 15per cent for PC-2100. Unless you are using applications that are very memory bandwidth intensive, PC-1600 probably won't create any noticeable improvements in performance.

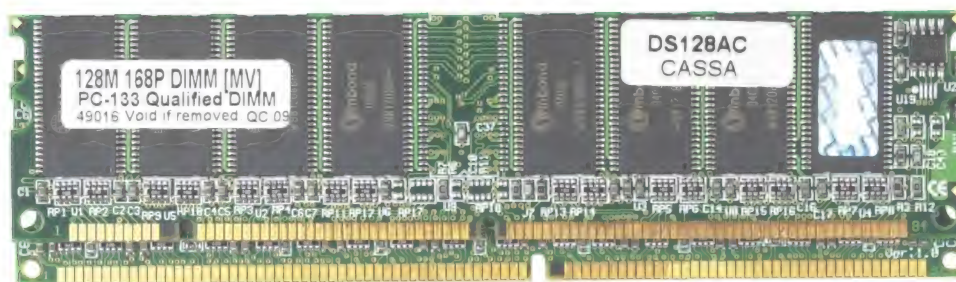
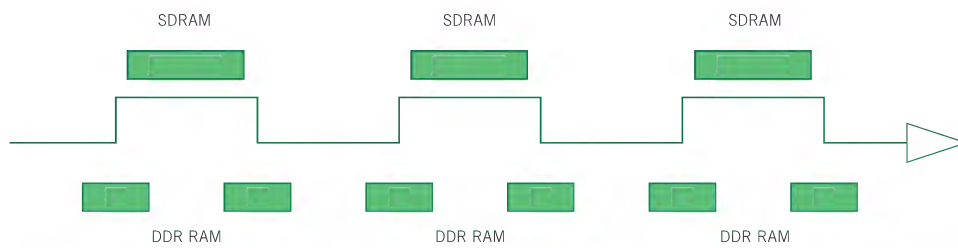
## Two are better than one

You could argue that having two 128MB DIMMS is more efficient than one 256MB DIMM.

Traditional DRAM uses memory banks so that the entire data bus is filled up by each bank. Most of you would remember SIMMs. Multiple banks were required to fill up the entire 32 or 64-bit bus. Because DIMMs have more pins, the entire data bus could be taken up by one DIMM (in other words, one DIMM per bank).

SD-RAM has multiple banks on a single DIMM.

Even though DIMMs use banks of memory, on an individual bank only one row can be active at a time. There are obvious advantages in having multiple banks on one DIMM because multiple banks mean that multiple rows of data can be open at once. This means that more data can ready to be moved to the CPU as soon as the CPU requests it. If data is required from a row that is not an active row then



① SD-RAM moves one piece of data per rising edge of the clock cycle, but DDR-RAM moves data on both the rise and fall

① The module in front is DDR-SDRAM and the one behind is a standard 168 pin DIMM

the new row must be pre-charged and the active row closed. The new row can then be opened and the data can be sent.

As we read earlier, each clock pulse can carry two pieces of data. One on the rise and one on the falling edge of the clock cycle. Let's say that there was only one bank of memory present, which meant that each DIMM could only have one row open at a time. If your system only had one DIMM then you only have one active row available to put data on the bus. If the CPU requests data on a different row then the bank must switch rows which means you lose valuable clock cycles in the process. But if you had more than one DIMM then you have more banks and more rows available for data throughput to the bus with each clock cycle. Get the picture?

In reality DIMMS actually do have multiple banks. But by simply having two DIMMS instead of one, you effectively double the number of banks and therefore, active, rows.

### AND IT LOOKS DIFFERENT TOO

DDR-DIMMS have 184 pins, as opposed to the 168 used on SD-RAM DIMMS, and only has one notch instead of two. Both vanilla SD-RAM and DDR-RAM DIMMS have multiple banks of memory that transfer data on a 64Bit data path. To add an extra layer of confusion, some manufacturers are also making 184 pin SD-RAM DIMMS, which of course need special chipsets to work. Simple isn't it.

Even though the new DDR-RAM modules haven't changed in their physical size, they don't fit in a conventional motherboard. If you want to use DDR-RAM technology then a motherboard replacement will be required. Fortunately most manufacturers have embraced DDR-RAM and re-designed their motherboards accordingly.

## Rambus Wars – Update

In issue 2 I wrote about Rambus and it's allegations of patent infringements. The trial between Rambus and Infineon was due to start in February.

The trial judge hearing the case between Rambus and Infineon rescheduled the trial for April 10, to allow Rambus to gather information that it claims Infineon have withheld. Rambus claims this information contradicts the depositions by Infineon regarding core aspects of the case. Infineon have upped the ante with claims of "racketeering" added to its allegations against Rambus. Meanwhile, the share prices for Rambus stocks dropped significantly, when it was rumored that the judge had issued a pre trial ruling, favourable to Infineon, which limits the scope of Rambus claims. Although the end of March showed the prices climbing again, Rambus would have to be feeling nervous.

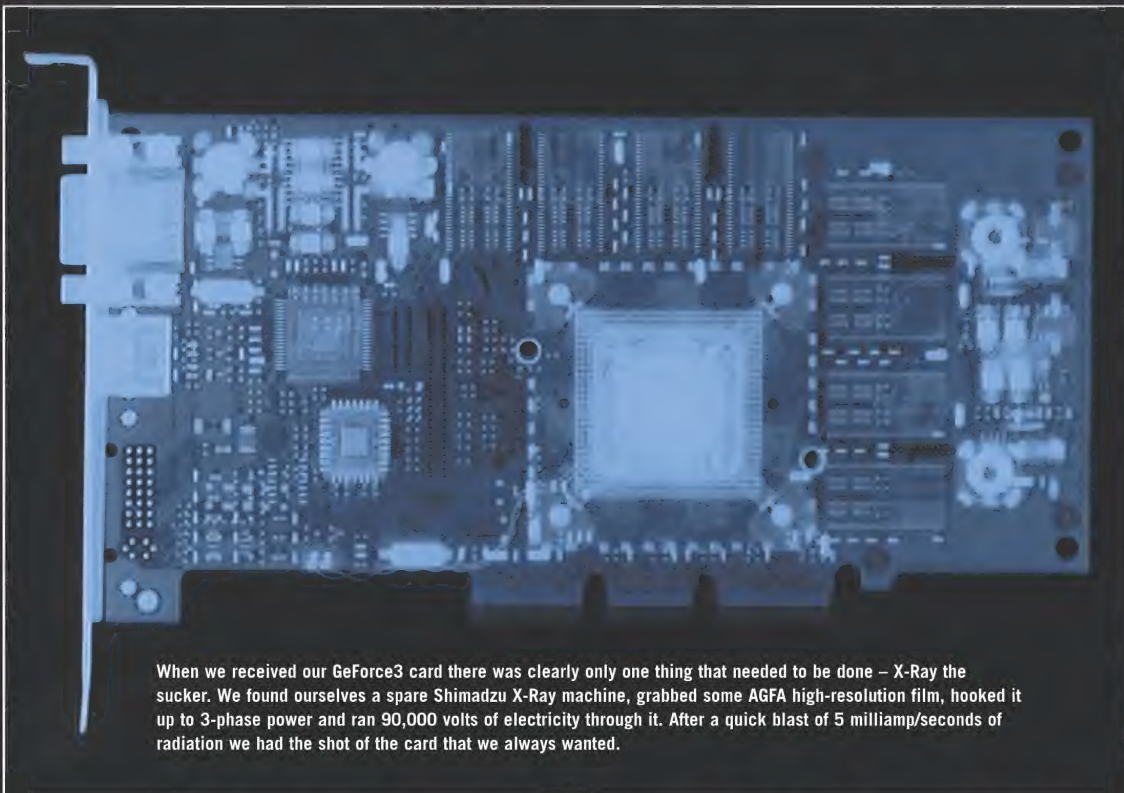
Intel has acknowledged its foolhardiness. *The Financial Times* in London have reported that Intel Corp. Chief Executive Craig Barrett suggested that Intel are shifting their stance.

"We made a big bet on Rambus and it did not work out," Barrett admitted. "In retrospect, it was a mistake to be dependent on a third party for a technology that gates your performance."

Despite some corners of Intel screaming their allegiance to Rambus, other corners of Intel are decidedly uncomfortable. The comment from Craig Barrett speaks for itself. With the introduction of RDRAM compatible memory and the high price of Rambus patented products Intel's relationship with Rambus is looking shaky. Intel has not ruled out the possibility of severing its marriage to Rambus. They are obviously keeping their options open, at least during the court proceedings, while the industry waits for an outcome.

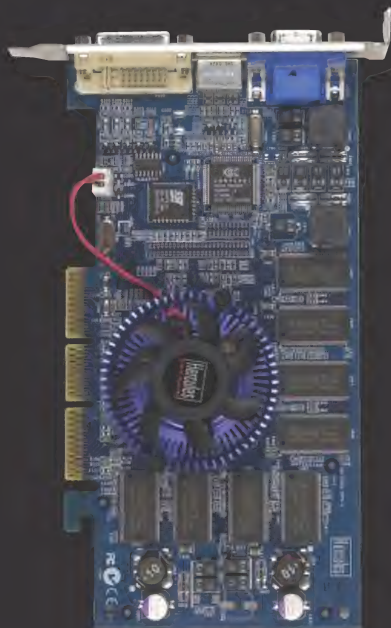
Thanks to T.B.A for their assistance with this article



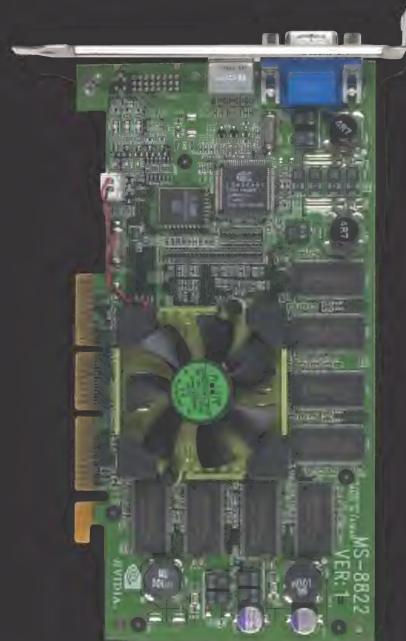


When we received our GeForce3 card there was clearly only one thing that needed to be done – X-Ray the sucker. We found ourselves a spare Shimadzu X-Ray machine, grabbed some AGFA high-resolution film, hooked it up to 3-phase power and ran 90,000 volts of electricity through it. After a quick blast of 5 milliamp/seconds of radiation we had the shot of the card that we always wanted.

## Hercules Prophet III



## MSI StarForce 822



# LIGHTSPEED

## Inside the GeForce3

John Gillyooly and Dan Rutter have a look inside NVIDIA's next generation graphics chipset and see just how it performs in the real world

The GeForce3 is the latest barrage in NVIDIA's move towards world domination. Unlike the slight tweaking of the GeForce256 that was the GeForce2, this is a whole new chipset. The existence of this chip has been rumoured for several months and was finally confirmed on the 27th of February.

Designed to work intimately with DirectX 8, the GeForce3 chipset will not hit its stride until more games are designed specifically for DirectX 8. Unlike the previous iterations of NVIDIA's Hardware T&L engine (which suffered from over a year of existence with almost no support) these DirectX 8 features should appear fairly quickly, as more and more developers start aiming towards the similarly cored Xbox as a gaming platform.

The hardest pill to swallow with the GeForce3 will be the price. Even though the prices we have been told are slightly lower than expected, at over \$1000 it is still a hefty sum of money. The major reason for this is the need for 64MB of DDR RAM running at a whopping 460MHz. This comes down to the fact that the card still relies on a brute force approach to rendering in which memory bandwidth is imperative.

The whole GeForce3 release has been somewhat of a shambles. When the rumours started circulating that the NV-20 would finally be unveiled on the 27th February at the Intel developer conference, everyone expected to have a card in their hands shortly afterwards.

The launch happened and was accompanied by a horde of technology articles popping up on the Web, but strangely these were accompanied by no benchmark results. As March progressed, the situation started to become clearer. NVIDIA was holding people back until there were stable drivers for the card. Still we waited. Australian distributors finally started to see their first samples trickle in during March. We had cards pass through our hands with the stipulated no benchmark clause. There was a concurrent rise in the frequency of leaked Detonator drivers popping up.

Finally the Detonator drivers hit the magic number 11.01, otherwise known as the stable ones. Finally we were able to run up the two cards we had received and put the technology into action. The results of these tests and an in-depth look into the many wonders behind the GeForce3 unfold over the next few pages.

### Big numbers

The GeForce2 core contains 25 million transistors, manufactured using a 0.18-micron process, meaning the smallest gates on the chip are 0.18 microns, or 180

nanometres across. In contrast, the GeForce3 uses a 0.15-micron process, allowing the transistors to be packed tighter and consume less power - it needs about as much power as the original 23 million-transistor GeForce256. Yet the GeForce3 GPU contains a gobsmacking 57 million transistors, which is a whole lot more than the latest Intel Pentium 4 Processor.

In terms of specification, the GeForce3 shares several features in common with its brethren. Like the GeForce2, the GeForce3 has four pixel pipelines, with two texture units per pipeline. The GeForce2 could render four dual-textured pixels per clock tick, which means that at the GeForce2 GTS's stock clock speed of 200MHz, you get an ideal 1.6 billion textured pixels (or texels) per second, giving rise to the '1.6 gigatexel' marketing claim, and GTS, 'Giga Texel Shader' name, for the GeForce2. The GeForce3 can do all this, too, but it can also combine its texture units to render a pair of quad-textured pixels in a single clock tick, instead of four dual-textured ones. The GeForce3's raw pixel and texel fill rate figures are not terribly exciting compared with the GeForce2 Ultra, but plenty of other features more than make up for that.

### Lightspeed Memory

One of the primary limiting factors for high speed graphics adapters like the GeForce2 is memory bandwidth. Even with expensive Double Data Rate (DDR) RAM, the limited bandwidth of the memory stops the GeForce2 GTS from living up to its imposing 800 megapixel per second fill rate, because the chip simply cannot get the information from the RAM fast enough.

The GeForce2 flogs the heck out of its memory, especially when you're doing things like anti-aliasing, which we'll cover in a moment. The GeForce2 Pro and Ultra cards have higher clock speeds and even faster RAM, but even so, this is still not enough »



## feature

&gt; Inside the GeForce3



Max Payne in full high speed T&L glory

to feed the GeForce chip all the data they need. Wind everything in a current 3D game up to the maximum settings, and your frame rate still plunges.

The initial release GeForce3 cards, like our Hercules review board, have the same memory on them as the GeForce2 Ultra cards: 230MHz DDR SDRAM, running at an effective 460MHz (compared to the 333MHz of the cheaper DDR memory on the GeForce2 GTS). But all of those extra core transistors allow the GeForce3 to do more interesting things to the data that's being shifted into and out of that RAM. Instead of a single 128-bit wide memory bus, the GeForce3 uses four separate 32-bit memory controllers as a part of its new 'Lightspeed Memory Architecture' (LMA), which give the same combined bandwidth per clock tick, but which can be combined in arbitrary ways to fetch amounts of data less than the full 128-bits. Two 64-bit memory operations on the GeForce3 can therefore happen twice as fast as they could on the GeForce2.

Another part of the GeForce3's LMA is a similar, but differently named, version of what ATI calls 'Hyper-Z'. NVIDIA's 'Visibility Subsystem' is the same as ATI's 'Hierarchical-Z': it's a form of Hidden Surface Removal (HSR). Conventionally, 3D cards will apply textures and effects to all the objects in a 3D scene, and will then check each rendered pixel through the z-buffer to see if there is anything obscuring it, and if so, the pixel, and all its associated memory, are

discarded. HSR eliminates things that won't be visible in the final image from the rendering pipeline before they begin to take up precious memory bandwidth. Combined with z-buffer compression and rapid z-buffer clearing, Visibility Subsystem lets the GeForce3 deal with the layering of objects in 3D space in a less memory-intensive way than earlier GeForce chips. All this means that although the GeForce3 and the GeForce2 Ultra have the same RAM, the newer card can beat GeForce2 Ultra frame rates by a significant margin in many current games, provided memory is the bottleneck, such as if you play in 1,600 x 1,200 resolution and/or use anti-aliasing.

### Anti-aliasing

Anti-aliasing smooths out 'jaggies' on 3D objects, making scenes look cleaner and more natural. Before the GeForce3, NVIDIA chips did anti-aliasing by simple supersampling. Supersampling renders the 3D scene internally at a higher resolution than the final output screen resolution, and then interpolates the higher resolution pixels down to the screen resolution. Thus 4x supersampling would render a 640 x 480 scene at 1,280 x 960 and interpolate four adjacent pixels into one when outputting to the monitor. The trouble with supersampling, as mentioned above, is that it stresses the heck out of the memory. The video card not only has to shift around four times the data (for 4x supersampling - twice the resolution in each



direction), but it also has to pointlessly do all of its texture rendering and filtering at higher than normal resolution. Textures don't need supersampling; only edges do.

The GeForce3 offers a new anti-aliasing method, that NVIDIA has unashamedly called 'quincunx'. It's named for the geometric figure described by its sample pattern, which is five pixels in a square, with one at each corner and one in the middle. Quincunx anti-aliasing doesn't render frames at higher than the display resolution, instead it creates two copies of each frame, just dumping the frame data into memory twice, and shifts one version of the frame half a pixel diagonally. So each pixel of the first frame has four diagonal nearest neighbours from the second frame. The quincunx algorithm figures out each final pixel value from the five-pixel clusters thus created. The result only takes up about twice as much memory bandwidth as non-antialiased graphics, making it about the same speed as 2x supersampling, but with image quality up there with 4x. The GeForce3's more efficient memory architecture helps it here as well.

### Programmability

When the original GeForce 256 came out, NVIDIA's marketing department told everyone, endlessly, that it was the first Graphics Processing Unit, or GPU. Their justification for this was that it could handle transform and lighting (T&L) operations in hardware, rather than having the CPU do all the work. More cynical souls pointed out that this was just an evolutionary development in 3D accelerator design, and that professional-level graphics cards have incorporated geometry engines for a long time. After all, the whole point of the 3D card is that it takes some of the graphics load off the CPU, so you could make just as good an argument about the original 3dfx Voodoo Graphics chip being a GPU. It's not as if coders could step outside the GeForce feature set and program the card to do whatever they wanted, after all. The GeForce3 has raised the bar a long way. Instead of having a bunch of hard-coded rendering capabilities, the GeForce3 is a truly, and quite flexibly, programmable graphics system. It's got the same T&L capability as its predecessors, but that is alongside another feature that NVIDIA calls the 'nfiniteFX engine', along with other components which NVIDIA calls Vertex Shaders and Pixel Shaders.

The Vertex Shaders can do all the 'transform' stuff - figuring out where things should be drawn, given the arrangement of objects and the location of the viewer. They determine what properties polygons should have, given their location in 3D space, their facing, their colour and texture, light state, and so on. They can do this fast enough that all of the properties of a large number of polygons can be changed in real time by, for instance, making a polygon skin stretched over moving bones for realistic modelling and animation of living things.

The Vertex Shaders can also do tessellation of curved surfaces - turning curved things into polygons - which is another handy feature for simulating things from the natural world. They can do motion blur and procedural deformation, modelling the effect of wind

or contact or liquidity on a surface, and lots of other stuff. One interesting feature of the GeForce3, and perhaps explaining some of its vast number of transistors, is that the core actually features a 'hardwired' T&L engine in addition to the Vertex Shader, and it cannot use both at once. The presence of the hardwired T&L is simply for DirectX 7 compatibility purposes.

The Pixel Shaders take the output from the vertex processor and turn it into an array of pixel values ready to be thrown to the frame buffer, and then onto the screen. They determine what the colour of each final pixel has to be, and they too can handle very complex operations in real time. The nfiniteFX engine can be programmed, using a new Vertex Shader Instruction Set, to do everything the GeForce2 can do, and a great deal more, such as combined bump mapping and environment mapping. Bump mapping is how you make a flat surface look as if it's got a proper texture in 3D, with crests and troughs that shine and shadow properly in the light, even if the light source is moving relative to the object, and environment mapping allows objects to reflect what's around them. Combine the two and you can make a realistic crumpled aluminium foil ball, for instance, without having to use a zillion polygons to do it.

You can also program the GeForce3 to have dynamic, calculated-on-the-fly bump mapping for things like reflective ripples in water, which appear and bounce correctly when you drag your in-game finger through a pond. That can be done with polygons, at great computational expense, but the GeForce3 lets it be done a lot cheaper. Because of the programmability of the GeForce3, it's actually hard to say what it can do. It's like trying to explain all the kinds of music you can play on a piano.

### DirectX 8

DirectX 8 is the latest incarnation of Microsoft's graphics and sound Application Programming Interface (API). Each new DirectX is a superset of the previous edition - it does everything the last one did, and adds more stuff. DirectX 8 lets programmers hook into the GeForce3's nfiniteFX features. They can do it in OpenGL as well by using the NVIDIA driver's OpenGL extensions. The DirectX 8 instructions, however, are standard no matter what graphics driver you are using. Thus for games targeted at the GeForce3, and comparable not-yet-released chipsets like ATI's successor to the Radeon, programmers are likely to prefer DirectX over OpenGL. If a game doesn't use DirectX 8's new features, though, and at the time of writing, none do, then none of the fancy GeForce3 programmability will come into play. It'll just work like a somewhat more efficient GeForce2 Ultra.

### Developer support

Here's what happens every time a super-exciting graphics chipset with amazing new features comes out. First, the marketing people go bananas and craft buzzword-heavy ad copy which the average graphics card buyer understands no better than they understand the similar bumf used to sell CPUs. The fact that the GeForce3 has free arbitrary swizzle and negate on each vertex program operand sure



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&gt; Inside the GeForce3



sounds impressive. The demos also definitely look great. So people buy the card. Then they discover that pretty much all of the super-fancy features aren't supported by any of their current games, or, surprisingly often, by practically all of the games that come out through a given chipset's whole production life. So if a new card has blazing fast memory and transparent acceleration of one feature or another that games actually use, then great, you'll see more speed. But the really funky stuff won't be used. It's startling how many games on the market today still don't even take full advantage of the hardware T&L support that debuted with the GeForce256.

There's a reason for this. The GeForce256 and GeForce2 accelerate the OpenGL transform and lighting commands, and their DirectX equivalents, but programmers can't assume that all, or even most, of their gamers have a card that can do what a GeForce does. So they do some or all of this work with tuned code in the game, rather than via the specialised and hardware specific API calls. Rolling your own code also lets you make groovy specialised effects that can't be done by the standard APIs, albeit with somewhat less-optimised performance.

Quake III Arena, for instance, uses OpenGL transform commands and so benefits from the GeForce hardware in that department, but it's got its own lighting engine. Many other games have their own transform and lighting code. If everybody in the world had a video card that hardware accelerated the same commands that the first two GeForce generations do, then it'd be more sensible to use those commands. But it wouldn't make them any more able to do the tasty things that roll-your-own code can do.

The great thing about the GeForce3 and DirectX 8 is that programmers can roll their own code and have it hardware accelerated. They don't have to stick to a hard-coded, creativity-restricting feature set in order to make use of the new chipset's power. So it's plausible that games that actually use all of those millions of GeForce3 transistors will be on the shelves relatively soon.

### Benchmarks

The release of the Pentium 4 last year reiterated the need for a carefully thought out benchmarking strategy. The introduction of new technology means that existing benchmarks may not particularly reflect the benefits of new features. The nfiniteFX engine, much like the Pentium 4's SSE2 instructions, needs to have software specifically written to take advantage of it. MadOnion.com's recently released 3DMark2001 has DirectX 8 based tests and is perhaps the best measure of the GeForce3's performance.

Unfortunately 3DMark2001 uses these DirectX 8 tests to generate the magical 3DMark number. This effectively penalises cards for not having a DirectX 8 programmable engine, and makes 3DMark2001 a poor choice for comparing the latest cards with those based upon older technology.

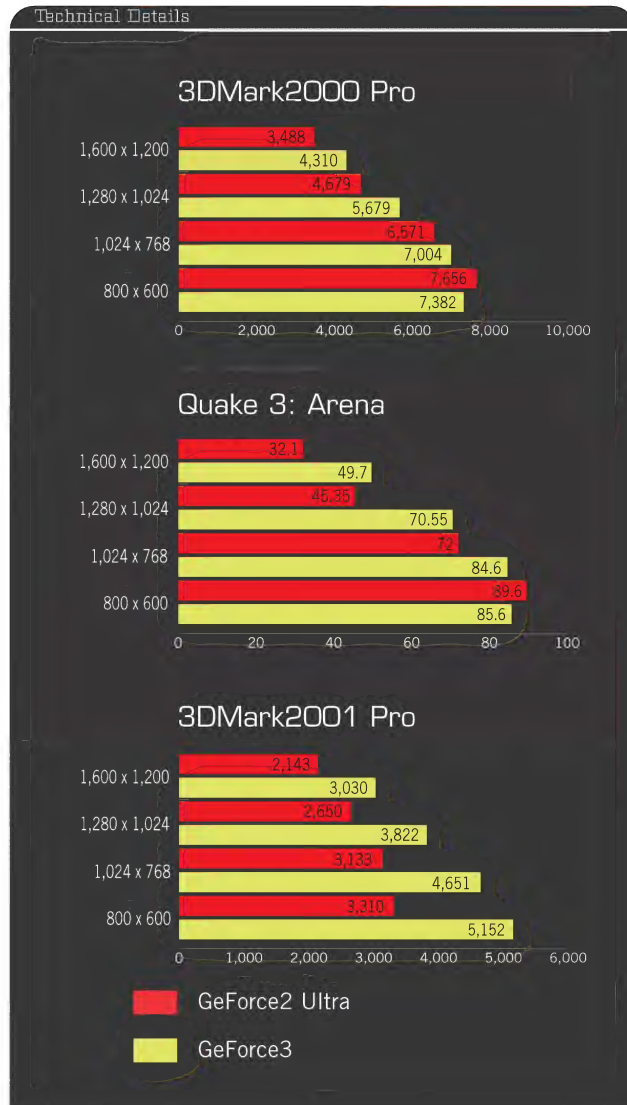
Keeping this in mind, and the fact that DirectX 8 specific games are still a way off, we have decided to focus more upon the gains that you can expect ➤



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now. The two benefits you should expect straight away are increased performance at high resolutions and fast anti-aliased graphics.

We have tested two GeForce3 cards, the Hercules Prophet III ([www.hercules.com](http://www.hercules.com)) and the MSI StarForce 822 ([www.msicomputer.com.au](http://www.msicomputer.com.au)). The cards both retail for \$1199 and benchmark almost identically, so for space considerations we have used an average result from the two cards in our graphs. We have also used a GeForce2 Ultra for comparison for two major reasons; firstly the similar RAM speeds and secondly for the plain fact that the Ultra is the only card that can get close to the GeForce3 in the speed stakes. The tests were done on our Pentium III 1GHz testbench. For the GeForce3 tests we used the new 11.01 drivers, and for the GeForce2 Ultra we used the current official 6.50 Detonator drivers.

## Legacy Performance

The first two sets of tests were run using Quake 3: Arena and 3DMark2000 Pro ([www.madonion.com](http://www.madonion.com)). The Quake 3: Arena tests were run using maximum detail settings and the atomic Quake 3 demo. The 3DMark2000 Pro tests were run in 32-bit colour with all other settings left as default.

The results highlight the advantage of the Lightspeed Memory Architecture (LMA) used in the GeForce3. At 800 x 600 resolution the higher core speed of the GeForce2 Ultra pushes it ahead of the GeForce3 in both tests. However, as the resolution increases and the traditional memory bottleneck comes into effect the GeForce3 pulls ahead, riding on the back of LMA.

Of particular note is the result in Quake 3 at 1600 x 1200. In an intensive demo (like the atomic one) 50 frames per second is very playable. Of course, you will need a monitor capable of handling high resolutions with good refresh rates, but the dreams of high-resolution gaming are finally starting to become a reality.

The next tests are from 3DMark2001 Pro. These have been added to show the disparity between DirectX 7.0a tests and DirectX 8 ones. Over the entire range of resolutions the GeForce3 sits ahead of GeForce2 Ultra, a result which is clearly not the case in the 3DMark2000 Pro tests. The major difficulty is that it is difficult to draw any assumptions from the results, besides the fact that the GeForce3 will perform better in DirectX 8 applications than existing cards. The disparity could be a result of the way that 3DMark2001 weighs its results, or signify a true difference in performance between the cards under the newer API. This is a problem that will hopefully be solved as more DirectX 8 based benchmarks, like the upcoming Aquamark, appear. Aquamark uses the engine from the in-development game Aquanox.

## You're all a pack of cunx

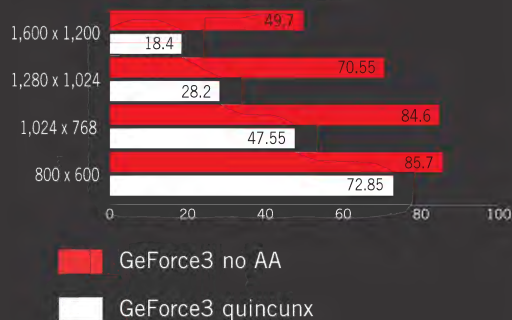
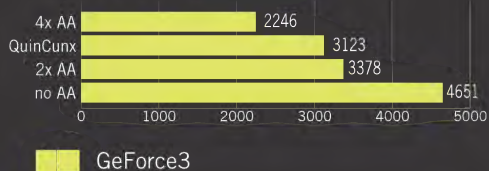
To examine the anti-aliasing potential of the GeForce3 we repeated our Quake 3 tests using just the GeForce3, firstly with no anti-aliasing and then using the all singing all dancing quincunx method. Quake 3 is very playable with quincunx running, all detail turned up and the resolution set to 1024 x 768. At higher resolutions the frame rate is still impressive, but will be slightly jerky with a lot of action on screen. As a side test we also ran quincunx through a subjectivity benchmark in CounterStrike, playing for a few hours at 1024x768 and with quincunx on. The game was smooth, highly playable and had never looked better. Quincunx should definitely improve the look of older games.

Our final tests were undertaken using 3DMark2001. We tested the GeForce3 using the standard 1024 x 768 32-bit colour tests. These tests were run using no anti-aliasing and then three other methods. The results show that the performance hit when using quincunx is very similar to the hit expected when using 2x supersampling. The method behind quincunx means that it looks more like 4x supersampling.





## Technical Details


Quake 3: Arena -  
HRAA Performance3DMark2001 Pro -  
HRAA Performance

## The verdict

The GeForce3 is a video card that is at least six months away from being able to perform at its full potential. When you put the DirectX 8 specific features of the card aside it still provides a benefit with today's technology. The inclusion of an "old school" hardware T&L engine sitting alongside the nfiniteFX engine means that the card will handle anything that a GeForce256 or GeForce2 can, and it is capable of doing it faster and at much higher resolutions.

NVIDIA may have stumbled slightly with their release of this product, but they have managed to deliver a card capable of truly jaw dropping graphics and with a flexibility that was missing in their previous cards. Coupled with its high speeds and ability to provide the double whammy of good looking and fast anti-aliasing, the competition have a lot to worry about.

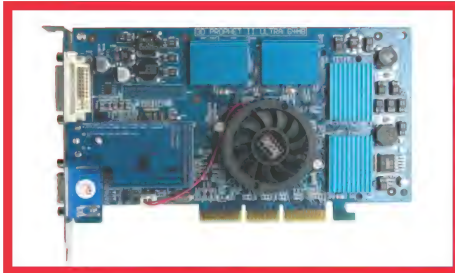
The only thing we can see holding the GeForce3 cards back from widespread success is the spiralling cost that accompanies these technical marvels and their nFinite possibilities.

 Currently, 3DMark2001 is the major DirectX 8 compliant benchmark. This test uses the cards Pixel Shader

survey

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- ☐ No
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- ☐ Off the shelf systems

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CPU?

Motherboard?

**15. What CPU do you own?**

- ☐ Celeron  
☐ Pentium  
☐ Pentium II  
☐ Pentium III  
☐ Pentium 4  
☐ K6-2  
☐ Duron  
☐ Athlon Classic  
☐ Athlon Thunderbird  
☐ Other (please specify)

**16. What do you want next?****17. Do you overclock your CPU?**

- ☐ Yes  
☐ No  
 If no, why not?

**18. Do you overclock your video card?**

- ☐ Yes  
☐ No  
 If no, why not?

**19. Is your Internet connection:**

- ☐ Modem 56k  
☐ Cable  
☐ ADSL  
☐ Satellite

**20. If 56k, do you plan to upgrade and if so, to which Broadband service?****ABOUT YOU****22. Which are your top 3 favourite websites?**

1. \_\_\_\_\_  
 2. \_\_\_\_\_  
 3. \_\_\_\_\_

**23. Do you prefer Internet or Magazines for:****I M**

- ☐ News  
☐ Hardware reviews  
☐ Games reviews  
☐ Features  
☐ Opinion

**24. Would you prefer to see a cover CD on atomic (this would mean a price increase)?**

- ☐ Yes  
☐ No

Is there anything you would like to see as a covermount?

**25. How do you purchase PC related products:**

- ☐ Retail  
☐ Mail order  
☐ Online

**26. What determines where you buy PC products?**

- ☐ Prices  
☐ Convenience  
☐ Staff

**27. If you are a computer reseller, what do you find most useful about atomic?**

- ☐ Product reviews  
☐ Review style  
☐ Product types covered

**28. Do you make PC related hardware purchases:**

- ☐ Every month  
☐ Every couple of months  
☐ A couple of times a year  
☐ Once a year

**29. Approximately how much money in the next twelve months are you intending to spend on computer products/services at home.**

- ☐ None  
☐ Under \$500  
☐ \$500-\$999  
☐ \$1,000 - \$1,999  
☐ \$2,000 - \$2,999  
☐ \$3,000 - \$3,999  
☐ \$4,000 - \$4,999  
☐ \$5,000 - \$7,499  
☐ \$7,500 - \$10,000  
☐ more than \$10,000

**30. How old are you?**

- ☐ Under 18

- ☐ 18 - 25  
☐ 26 - 30  
☐ 31 - 35  
☐ 36 - 45  
☐ 46 - 55  
☐ 56 - 65  
☐ over 65

**31. Sex**

- ☐ Male ☐ Female

**32. What is your job title?**

- ☐ Student  
☐ Chairman/Owner/Partner  
☐ IT/MIS/DP  
☐ Finance manager/accountant  
☐ Sales/marketing manager  
☐ Department/other manager  
☐ Lawyer/Doctor/ other professional  
☐ Engineer/Scientist  
☐ Programmer/systems  
☐ Computer consultant  
☐ Designer/artist  
☐ Teacher/lecturer  
☐ Clerical  
☐ Tradesperson  
☐ Retail  
☐ Unemployed  
☐ Other

**33. If applicable, what is your involvement in computer purchasing at your work place?**

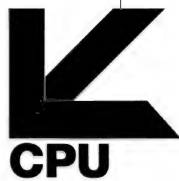
- ☐ Specify products  
☐ Order Products  
☐ Specify suppliers  
☐ Make suggestions for product or supplier

**34. Which of the following best describes your company's primary business?**

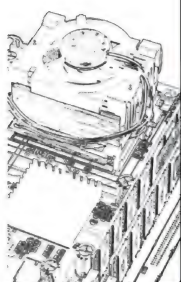
- ☐ Manufacturing  
☐ Computer manufacturing (hardware/software)  
☐ Govt./Public Service  
☐ Trade (wholesale/retail)  
☐ Computer trade (dealer/VAR)  
☐ Banking/insurance/finance  
☐ Construction  
☐ Education  
☐ Manufacturing  
☐ Transport/communications  
☐ Distribution  
☐ Health care  
☐ Media/publishing/design  
☐ Other (please specify)



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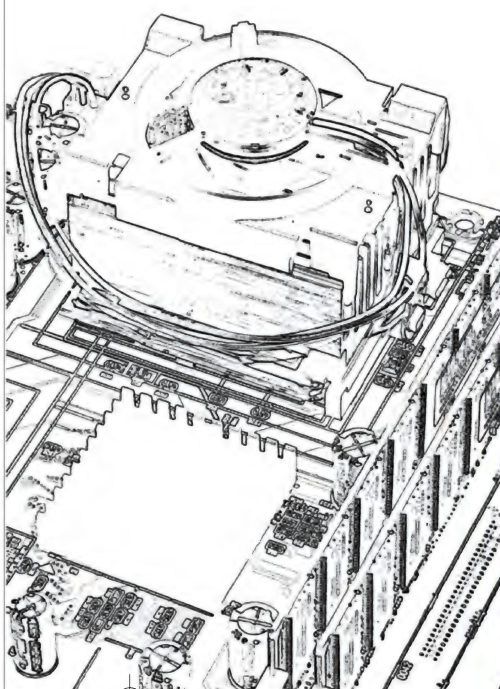
01



02

# CPU<sup>x2</sup> CPU<sup>x2</sup> central processing unit

03



X2



# Dual CPU Systems

Daniel Rutter finds that Dual CPU PCs don't necessarily mean double the power. Is Symmetric Multi-processing a dud?

**Need more speed?** Your 1GHz Pentium III not up to the task? Well, if you can't yet get your hands on a 2GHz CPU, why not just stick in two 1GHz CPUs? It means the same thing right?

Multi-processor systems have been around for years, and have generally been the exclusive province of high-end servers and hefty workstations. These days, however, it is becoming an increasingly inexpensive option for the home user to upgrade their motherboard and throw in another processor for that extra nudge over the cliff – that extra push to '11'.

There is a certain appeal to the concept of having not one, but two GHz processors throbbing away inside your case, but does it really make a difference to performance in every-day tasks and games? Read on as we take some serious multi-processing kit and run it like the clappers through our benchmark suite to find out whether that second processor is really worth the cash.

## SMP explained

SMP (Symmetric Multi-processing) is the technology used by multi-processor PCs. In SMP, two or more CPUs share the system resources – RAM, disk storage and so on – and can work on different tasks at the same time using multi-threading, which is explained later.

There are other ways to do multi-processing. Asymmetric multi-processing systems, for instance, can give separate CPUs their own storage and I/O hardware. The CPUs can, in fact, be whole separate computers unto themselves, but running special software to make them able to behave like one big machine.

Asymmetric multi-processing is a good way to construct reasonably general purpose and relatively inexpensive supercomputers. There's more than one way to do it with off-the-shelf PC hardware and software, such as the Linux/FreeBSD Beowulf Project ([www.Beowulf.org](http://www.Beowulf.org)). On a larger scale, things like the SETI@Home project (<http://setiathome.ssl.berkeley.edu>) and distributed.net employ the same basic concept. They connect lots of privately owned PCs over the Internet to attack massive problems, like encryption cracking, which can be chopped up into many smaller tasks.

But asymmetric parallel processing does not give you a system that's easy to code for – a massively parallel meta-machine's sure as heck not IBM-compatible. Asymmetric systems also get less and less useful for general computing tasks as the pipes between the CPUs get thinner.

## OS selection

To take advantage of SMP at all, you need an operating system that supports it. Windows 95 and its descendants – Windows 98 and Windows ME – are a dead loss. They don't support SMP at all. These operating systems install OK on an SMP system, but all but the first CPU will just sit there idle.

Windows NT supports SMP, and so does Windows 2000, which is really just Windows NT 5.0. Linux and BeOS support it too, and so does Mac OS, with some caveats.

In an OS like Windows 2000, the operating system can hand any task to any processor, depending on which one it thinks has the least to do. If one job on a twin-CPU computer takes up a lot of CPU time, but you want to run other programs as well, no problem; the other CPU can do it. As long as the CPU-hog program doesn't also hog things like RAM that the two CPUs share, you'll get a big speed boost. Few real tasks tread lightly enough on the rest of the system that you get more than about a 75 per cent performance improvement for any given task from adding another processor, but that's still a significant gain.

Another way both CPUs can find themselves doing something on a twin-processor box is when you use multi-threading. This means that the operating system splits all the tasks on the system into individual threads that can be split between the two CPUs. Some applications are also inherently multi-threaded, allowing the OS to run the application across both CPUs at once.

For example, a graphics program that is performing a complex and processor-intensive filter operation on a large file can have one CPU to do the top half of the picture, and the other to do the bottom. Alternatively, the two CPUs may be doing quite different jobs for the one application, as long as there's no requirement that the output from one of the jobs be the input to the other, or you could get into a situation where one thread is idle and waiting for the other. Another issue is the possibility of the system regressing into an infinite loop, as each thread is waiting for data from the other. The OS has to manage these situations and insure that both processors are being utilised to their maximum capacity.

Unfortunately, most programs are not multi-threaded. Some programs are necessarily single-threaded because the nature of the computations they perform makes it impossible for them to work any other way. Sometimes it's just not possible to start on Job 'B' until Job 'A' is finished. ➤

## feature

&gt; Dual CPU Systems

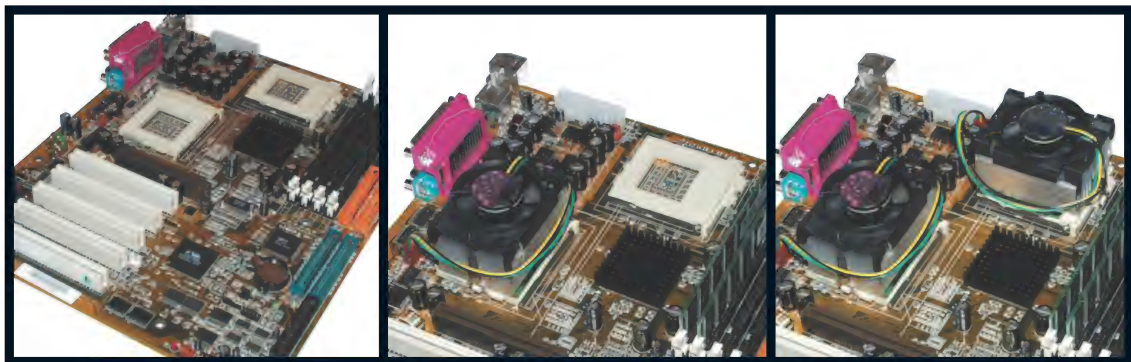


ⓘ The mighty VP6 - packing 2GHz of Pentium III glory

Most single-threaded applications, though, are that way because it's not a trivial programming task to make a program multi-threaded. Since the vast majority of desktop computers only have one CPU, there's not much reason to implement multi-threading, even when it could help considerably. The market in consumer terms is just not there.

Mac OS, on the other hand, is different. Mac OS X supports SMP in the same way as the Windows NT and 2000, but earlier versions of Mac OS, up to

control of the CPU Front Side Bus (FSB) and lets you adjust it without changing the speed of the other system buses. It also lets you fiddle with the CPU voltage to further ease your overclocking adventures. It's got four IDE connectors, too; two of them run from the integrated UltraDMA/66 controller, and the other two from an additional High Point HPT370 UltraDMA/100-capable controller. The VP6 costs less than \$360 as this goes to press, and Socket 370 Pentium IIIs aren't too painfully expensive, so it



ⓘ Left to right: Zero to 2GHz in 60 seconds

and including OS 9, only support multi-threaded applications, not true system-wide SMP. The OS itself only uses the first processor for its own tasks, and it can't make other apps use anything but the first CPU either. By default, everything runs on CPU number one. If an application is multi-threaded however, such as several popular Mac productivity apps like Photoshop, the second CPU then gets used.

### The test box

Not being ones to do things by halves, we got some top-spec hardware together to test the usefulness of giving a PC a second brain.

The Abit VP6 is a popular dual-CPU PC motherboard based around the VIA Apollo Pro133A northbridge, and the VT82C686B southbridge. It is the successor to the highly popular BP6, which works with Socket 370 Celerons, but which doesn't work with newer model Socket 370 CPUs, including current 'Coppermine 128' Celerons, which are unfortunately completely incapable of SMP, no matter which motherboard you use.

The VP6 is a solid Socket 370 Pentium III motherboard, with no really remarkable features beyond its dual CPU sockets. The VP6 has BIOS-setup

makes a good testbed to demonstrate what dual CPU systems can, and can't, do.

### Making numbers

So what kind of performance benefits can a second CPU give you? In the rare cases where you have got a program that does CPU-intensive work but has practically no interaction with any other subsystem, going to dual CPUs will give you about the perfect 100 per cent speed increase you'd expect.

There are very few real-world applications that work that way, though, and most such tasks are pointless as CPU benchmarks since they give no reliable indication of real world performance. But if you run, say, the distributed.net client software on a dual CPU machine, it will run two threads and be twice as fast, full stop. In the world of real applications, things are less exciting but you can still get a worthwhile speed boost.

Rendering the standard Lightwave 6 raytrace.lws benchmark scene in 640 x 480 resolution, for example, took four minutes and 28 seconds using only one thread. Lightwave lets you select the number of threads it spawns, and thus the number of processors it can use at once. Switching to two threads dropped the render time to two minutes 56



seconds - a thoroughly worthwhile improvement of a bit over 50 per cent.

Similarly, programs like Photoshop that also do some multi-threading can show an impressive amount of acceleration, depending on what you do. Again, about a 50 per cent speed increase for Photoshop on a dual CPU machine is plausible, whenever you're doing some seriously CPU-intensive operation like applying a big filter or changing the colour space an image uses.

What about games? Unfortunately, practically no games support multiple CPUs at this time. The only popular one that does is Quake 3 Arena, and even it doesn't use more than one CPU at default settings. To enable SMP support in Q3A, you have to bring down the console (with the tilde key - '~') and type **'r\_smp 1'** and then **'vid\_restart'**

Usually, doing this on an SMP machine will make no perceptible difference at all because most people run first person action games like Q3A in a pretty high resolution, and the chief limiting factor for game performance is thus the speed of the video card, not the CPU.

To minimise the effect the graphics subsystem had on the game frame rate on our dual gigahertz box, we set the resolution to 320 x 240, dropped texture and display depth to 16-bit, and used minimum texture detail and bilinear filtering, thus bottlenecking the CPU, and not the graphics card. We left the geometric detail high, and played our stock atomicMPC demo file with both the `r_smp` option set to the default 0, and the dual-processor 1 using Q3A version 1.27g.

The results? With one CPU working, we averaged 94 frames per second. With two, we averaged 111. That's an 18 per cent gain, and would be noticeable if it held up for higher resolutions. But, unfortunately, it doesn't.

Winding the graphics settings up to something more realistic - 1,024 x 768 at 32-bit colour and texture depth, trilinear filtering, high texture detail - resulted in the SMP speed bonus dropping to little more than ten per cent.

1,024 x 768 also isn't a very high resolution these days, and the GeForce2 Ultra was the fastest video card we could get our hands on. If you run a slower video card and/or run in a more demanding video mode, the advantage from doubling up a 1GHz PIII would be, for you, even smaller. Even so, if it was between upgrading your graphics card, or buying a dual-CPU board and second processor, the graphics card will give you the most bang for your buck.

On the plus side, you can run a game on a multi-CPU system while you're doing some other computationally intensive operation, and have the game's CPU load steered to a different processor, allowing the background task to continue.

Given the crash-prone nature of many games, though - if anything's going to winkle a bug out of a driver and hard-crash your PC, a game will - it's not a good idea to have something mission-critical running at the same time.

An SMP box, at least, can handle a few dedicated

game server executables running at the same time as CPU-intensive productivity software.

For most applications, unless you're running multiple CPU-intensive programs at once, a dual processor computer will be no more useable than a single processor one. The speed increase certainly won't be worth paying for the second CPU. If you can go dual on the cheap, though, things change.

### Lopsided computing

There is absolutely nothing in the SMP spec that says that the CPUs have to be the same speed. It's just sort of assumed that they will be. Most motherboards, like the VP6, just don't let you set the CPU FSB, multiplier and voltage separately for their two CPU sockets. Same FSB, same multiplier, same core speed, right? Yes. But...

All Pentium III CPUs have a locked multiplier. They run at a fixed multiple of the FSB speed, no matter what multiplier you try to set. As long as you've got CPUs that work from the same FSB, such as a couple of 133MHz FSB PIIIs, and they both run OK at the same core voltage, you can just plug them both in. Put the faster one in the first socket and you are away.

Quite a few overclockers have, for instance, old-model 100MHz FSB PIII 500s that run just fine at 133MHz FSB, for a 667MHz core speed. You can plug a chip such as this in as the second CPU alongside something like a 1GHz primary CPU, and all will be well.

Set the core voltage to 1.7V so the 1GHz CPU runs, and you're only giving the slower chip 0.1V more than it expects. It probably needs that much to run at 667MHz, anyway. Give it a big chip cooler, as any sensible overclocker will have already, and it'll be happy as a clam.

Similarly, you can install, say, a 1GHz and an 866MHz CPU, both of which are 133MHz FSB parts, for 1,866MHz of aggregate speed. Bump the Front Side Bus up to 144MHz - a modest overclock - and your two processors now run at 1,080 and 936MHz, respectively, giving you a hair more aggregate speed than a true dual-1GHz machine.

There's not a lot of point doing this if you don't already have a Socket 370 PIII sitting around. You can't buy new PIII 500s any more, and the slower chips currently on sale aren't a ton cheaper than the fastest ones, so you might as well aim big.

### Overall

Throwing a second CPU into your PC can, in some circumstances, double your effective performance, although for most home users and gamers, it won't give you much more bang for your buck. On the other hand, you can get it happening surprisingly cheaply these days, not to mention the pose value of sticking two Intel Inside badges on your PC, if you enjoy that sort of thing.

Dual-CPU Socket A Athlon and, possibly even, Duron motherboards should be along by the time you read this, and they ought to offer even cheaper, and faster multi-processor power. So if you are looking for some serious budget-priced workstation grunt, the future has never looked better.

Hardware for this feature was kindly provided by Aus PC Market, <http://www.auspcmarket.com.au> ph. (02) 9817 8933

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reviews

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reviews

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# reviews

## Bennett Ring just can't resist mentioning the GeForce3, and hitches a ride on the mobile peripheral revolution

I simply could not write this column without mentioning the GeForce3, and anyone that has seen the new 3DMark2001 benchmarking program running on NVIDIA's latest wonder child will know why. The Nature scene, with its swaying trees, blowing grass and water so realistic I wanted to dive into the monitor totally blew me away when we got our first GeForce3. Sure, it was running at a lowly twenty frames per second, but when things look this good frame rates aren't quite as important as they used to be.

While the jump from current graphics standards up to GeForce3/DirectX 8 graphics isn't as revolutionary as the jump from non-accelerated to 3D accelerated, it is still one of the most impressive advances in graphics technology that I've seen in a long time. Which can only be a good thing, considering the rather slow pace of the evolution of graphics cards recently. Sure, there have been new and over-hyped technologies such as hidden surface removal and tile based rendering, but none of these have had the same visual impact that the new GeForce3/DirectX 8 features are going to have. Also, NVIDIA's involvement with Microsoft's development of DirectX 8 should also ensure a wider level of support for the features of the GeForce3 than the other manufacturer's competing video cards and technologies.

How long it takes for these new features to be widely used in games is a question yet to be answered. But if we consider that the Hardware T&L features of the GeForce cards still aren't being taken advantage of by the majority of games currently being released, it might take another couple of years before game developers untap the full potential of the technology. I won't go on about the GeForce3, as we've already devoted a large chunk of the mag to it, and we'll no doubt be covering it in more detail in the very near future.

This month's hardware reviews have an underlying theme that is beginning to crop up more frequently in PC hardware design - mobility. Thankfully, this no longer equates to woeful performance of the device, with most of the mobile products we're seeing having more than enough power to do the everyday tasks that we require.

We didn't think we'd ever want to, but this month sees a review of the first PDA device to grace atomic's pages. We couldn't let the Handspring Visor slip by without a mention, as the team behind the original Palm Pilot guided the creation of this handy little device. From what John has to say, they've used all they learned from the Palm to create a well-rounded PDA with the power to expand exactly how you desire it to.

The USB Direct Connect device from Belkin is a nifty USB

networking device that looks more like an alien egg sack than a networking device. This little pod has the power to network PCs via the USB port, without the need to install troublesome network cards. Simple to configure and offering the same data transfer speeds as a 10Mbit network, these units could prove to be a hot item for the LAN freak in us all.

The Iomega Predator is a portable CD-RW unit, but unlike its namesake doesn't come with a cool cloaking battle suit, which proved to be a bit of a letdown. Even more of a letdown were the incompatibility problems we encountered on various systems with this device. If a device is going to be considered mobile, it needs to be compatible with a wide range of hardware, whilst being simple to install. Unfortunately the Predator was neither of these, but it certainly wins points in the aesthetics department.

Thankfully the Amacom Flip Disk restored our faith in mobile storage devices. The unique flip PCMCIA port combined with the standard IDE and USB ports ensure that this little haven for data will be equally at home connected to both laptops and desktops.

We also had a chance to check out a high end PC head mounted display, and it was my pleasure to enter the VR realm to check this baby out. Surprisingly, I actually managed to hold my lunch down after extended use of this device. When compared to the chunder inducing headsets of the past, it is quite apparent that VR technology is at last beginning to mature.

Finally, for all the AMD fans we have a review of the new 1.33GHz Athlon. Intel must be really feeling the Athlon heat as the clock speed difference between the P4 and Athlon begins to narrow, and this is indeed one hot little chip, pumping out a maximum of 73 watts of heat. Of course Intel aren't going to take this latest release lying down, and are set to release the 1.7GHz P4 in the very near future. The CPU war drags on... ➤



reviews

» atomic benchmarks

# atomic benchmarks

## Take a look inside the atomic Labs testing procedures

Here at atomic it is our primary intention to give you the final word on the latest in hardware and PC technology. An integral part of determining the performance of a particular piece of hardware is benchmarking - and this is something that we take very seriously in the atomic Labs.

### atomic Applications Benchmark

The atomic Applications Benchmark suite uses an assortment of off-the-shelf applications and is an excellent test of a system's overall performance, including CPU, RAM, hard disk and graphics card, when running conventional 2D programs. Desktop resolution set to 1,024 x 768 at 32-bit colour, DMA enabled, latest drivers for all hardware including chipset inf updates.

### SiSoft Sandra 2000 Professional

Sandra, from SiSoftware ([www.sisoftware.co.uk](http://www.sisoftware.co.uk)) is a comprehensive benchmark and diagnostics utility. It contains dozens of special module applets that retrieve detailed information about the specification and settings of a system by polling each component's built-in firmware or BIOS. Sandra also features a small suite of synthetic benchmarks for specific components such as CPU, memory, CD-ROM and hard disk.

### 3DMark2000 Pro

3DMark2000 Pro from MadOnion ([www.madonion.com](http://www.madonion.com)) is a powerful benchmark for testing Direct3D performance, and is the successor to the popular 3DMark99 MAX. Although it is a synthetic benchmark, it uses the advanced Max Payne 3D engine which is representative of the latest in Direct3D performance and technology.

### 3DMark2001 Pro

3DMark2001 Pro from MadOnion ([www.madonion.com](http://www.madonion.com)) is the next

progression of the popular benchmark. It also uses the MAX-FX engine from Max Payne and heavily emphasises DirectX 8 functions including programmable shaders. The results are not comparable with 3DMark2000 Pro results.

### Quake 3: Arena

Quake 3: Arena, from id Software, is the extremely popular first-person shooter that represents the latest in OpenGL gaming technology. Q3A has a built-in benchmarking utility and some built-in demos that can be used to test graphics card performance. These demos are fairly simplistic, however, and are not representative of the worst conditions that the game can offer to a graphics card, so we developed our own atomic demo that pushes the hardware as far as possible.

### Other Benchmarks

Sometimes we need to break down the tests into more specific areas, such as hard disk performance, or a particular facet of 3D, like transform and lighting or SSE. For this we can draw upon a vast number of applications, games and dedicated benchmarks for these specific purposes, such as CD Speed 99, Evolve, MDK2, Adaptec Threadmark or Mercedes Benz Truck Racing. Whenever we use one of these special benchmarks we will outline the nature of the tests, the testing procedures as well as any settings that we use.

## atomic Testbench specs

There are two testbenches in the Labs, one for running AMD processors and one for Intel processors. Both are running Windows ME, DirectX7.0a or DirectX 8, Liveware 3.0 for Windows ME and Detonator 6.50 reference drivers. For your reference, in all our benchmark tests we have included yardstick scores showing how our two testbenches perform in that test.

- AMD Athlon Thunderbird 1GHz system – ASUS A7V motherboard
- Intel Pentium III/1GHz system – ASUS CUSL2 motherboard (Both supplied by CASSA, (07) 5445 2992, [nathan@cassa.com.au](mailto:nathan@cassa.com.au))

### Common Components

- Transcend 128MB PC133 CL2 SDRAM (Supplied by CASSA)
- Transcend 128MB PC2100 DDR RAM (Supplied by CASSA)
- Hercules Prophet II GTS 32MB (Supplied by Guillemot, [www.hercules.com](http://www.hercules.com))
- SoundBlaster Live! Player (Supplied by Creative Labs Australia, [www.creaai.com](http://www.creaai.com))
- ASUS 12x DVD-ROM (Supplied by CASSA)
- 7,200rpm UDMA100 20GB hard disk
- Floppy drive
- 350 watt PSU

## Benchmark settings

### 3DMark2000 Pro

- 1,024 x 768, 16-bit colour, 16-bit textures, 16-bit z-buffer, triple frame buffer
- 1,024 x 768, 32-bit colour, 32-bit textures, 24-bit z-buffer, triple frame buffer
- 1,600 x 1,200, 16-bit colour, 16-bit textures, 16-bit z-buffer, triple frame buffer
- 1,600 x 1,200, 32-bit colour, 32-bit textures, 24-bit z-buffer, triple frame buffer

### Quake 3: Arena atomicmpc demo

All tests use Quake 3 version 1.27g

- CPU: 320 x 200, max geometry detail, lowest graphics settings, high sound quality
- Graphics cards: 640 x 480, normal quality graphics settings, high sound quality
- 1,024 x 768, all graphics settings maximum, high sound quality
- 1,600 x 1,200, all graphics settings maximum, high sound quality



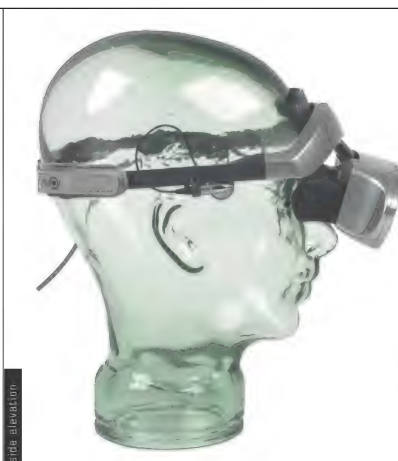
**ADVERTISING**

## reviews

» CyVisor DH-4400VP Head Mounted Display

# Cy-Visor DH-4400VP Head Mounted Display

Bennett Ring goes into Cyborg mode with this expensive toy



## specifications

- Image Output: 800 x 600 RGB
- Inputs: Y/C, Composite, RGB
- Weight: headset 160g; power supply 180g
- Viewing angle: 31° diagonal
- [www.mindflux.com.au](http://www.mindflux.com.au)

## price

**\$2699.00**



It's been approximately six years since I tried my first head mounted display unit. Back then it was wise to complete several warm up exercises before playing to prepare my neck for the weight of the chunky VFX1 HMD. I booted up Descent, eagerly anticipating my first VR experience. Seconds later several words immediately sprang to mind: clumsy, uncomfortable, nauseating and blurry. However, it did demonstrate the potential of VR, so I thought I'd leave it for a few years to give

the technology time to catch up with the vision.

Six long years later and we have the Cy-Visor DH-4400VP, an attractive HMD produced by Daeyang E&C. The first thing you will notice is the striking appearance of the unit, with its ultra sexy chromed finish. Weighing in at a meagre 160g, the unit is light enough to ensure that neck strain will not become an issue. A separate power pack supplies power to the unit, with the option of using the included DC adaptor or, for the mobile user, a Sony InfoLithium battery.

A wide range of input devices can be attached to the unit, from portable DVD players to standard PCs, courtesy of the D-sub 15-pin, S-Video and RCA video ports. Stereo audio is also

provided by the stereo audio input coupled with the built-in headphones. The maximum supported resolution of the unit is 800 x 600, but surprisingly the Windows desktop still appeared crisp and clear.

When in use, the operator is presented with an image the same size as a 44in screen suspended in space two meters away. Unfortunately the view is binocular, not stereoscopic, so don't expect any 3D effects. Also, the small field of view leaves you with the impression that you are still watching a small screen, not the all encompassing view that we would expect from a VR unit.

Watching a DVD through the unit was more than acceptable, with little to no pixellation of the onscreen image. However, playing games with the headset proved to be more problematic. The screens for each eye use LCD technology, and the unit suffers from the same problems of colour washout and loss of detail that most LCD projectors suffer from. After firing up a few of my favourite first person shooters, I noticed that recognising enemies in the distance was next to impossible, especially if they happened to be in a darkened area of the map. Things weren't so bad when playing arcade style games, but for games that require any level of visual precision, the detail level simply isn't high enough.

After prolonged use the unit started to become uncomfortable, with several points on the arms and light shields 'digging' into my head. Don't expect to be able to play for extended periods of time either. The first thing you see when powering up the unit is a warning message not to use the device for any longer than two hours.

Priced at approximately \$2,700 without any head tracking facility, the Cy-Visor DH-4400VP is a rather expensive gadget with little to no benefit over a conventional monitor for the majority of users. It is definitely a big step up from the HMD I tried so many years ago, but it is obvious that the realm of VR is still lacking the power it needs to become a practical display method.

atomic  
**6.5/10**





**ADVERTISING**

## reviews

&gt; VideoLogic DigiTheatre PC

# VideoLogic DigiTheatre PC

David Kidd just can't get enough of that old speaker lovin'

It seems that Creative is slowly losing its firm hold on the domestic PC audio market. With the Hercules Game Theatre breaking ground in affordable, high quality hardware, consumers can begin to enjoy a similar amount of choice with their PC audio as they can with say, video devices. Trying to get PC users to upgrade their current audio set-up to support digital surround is a lot harder and more expensive than one would think. Most of us would already have a sound card and a 4-speaker surround set which, in order to get true 5.1 surround sound would require purchasing a new 5.1 surround card with a 6-speaker set. VideoLogic have attempted to solve this problem by packaging the successful DigiTheatre surround sound speaker set-up with a digital 5.1 compatible SonicFury audio card.

Of all the PC surround speaker sets on the market, the DigiTheatre represents one of the classiest around. The rear/surround speakers are the typical cube shape while the front speakers look like two rear speakers mounted on top of each other. The upright subwoofer/amplifier unit is one of the largest around with a 170mm drive unit and a frequency response between 50 and 200Hz. Located on the sub is a simple panel giving control over volume and AC-3/Stereo input selection which will leave some unsatisfied, especially with the amount of separate controller boxes available. An optional switch box will allow the connection of up to four stereo input channels for such other audio devices as CD, VCR, TV or Tuner.

The SonicFury is a standard soundcard providing the amplifier with a true 5.1 digital sound. It utilises the Cirrus Logic Crystal SoundFusion DSP processor and supports EAX, A3D, DirectSound and Sensaura 3D. External connections include 2 stereo outputs, gameport, microphone line-in and a VersaJack. The VersaJack can be used to provide coaxial digital out, centre/sub output (channels 5 & 6), extra headphones or stereo quad-recording line-in. With the standard DigiTheatre speaker set (i.e. without a digital decoder box) the digital output from the SonicFury is not used.

The SonicFury controller software is dropped into the Windows Control Panel and is a fairly standard utility providing basic equaliser, reverb and volume functions. The combination of the SonicFury and DigiTheatre speaker set provided a fantastic surround sound in both games and DVD playback. I used Thief 2 and Descent Freespace 2 to test 4-channel surround and was suitably impressed. Similarly, the AC-3 stream from the DVD,



## specifications

- SonicFury: Six channel DSP
- Supports Sensaura 3D, A3D, EAX, DirectSound, DOS legacy, two stereo lineouts, microphone jack, gameport and 'VersaJack'
- Speakers: Amplified 5.1
- Power Output: Subwoofer- 25 watts RMS
- Satellites- 7.5 watts RMS each
- Syslink ph: 03 97222089
- WinDVD 2000
- [www.videologic.com](http://www.videologic.com)

## price


**\$695.00**

combined with the included WinDVD software decoder, cemented the system as a true contender in the surround sound world. All six channels were clear and definite, retaining clarity through all ranges, which is rarely found in speakers at this price range. The speaker set happily handled high-volume input with little or no distortion.

The individual volume for each channel and a master volume can be adjusted from the SonicFury control panel. The volume control on the sub is intended as a master override and would normally be set to suit room conditions and fine adjustments made from the SonicFury.

The front speakers, although funky in their design, may also prove too large for some desks while the elongated centre speaker is slightly awkward and cumbersome to position between the two front speakers.

WinDVD is a great utility to provide DVD playback with multi-channel audio, the retail version of the SonicFury has a comprehensive bundle of leading music apps, and is available at small extra cost (about \$50) by purchasing the DigiTheatre LC (without sound card) and the SonicFury retail for those who want the music apps.

Although the DigiTheatre stands on its own as a top-performer in its field, the SonicFury may deter those looking for a more feature-packed sound card. Overall, the DigiTheatre PC is by and large a 5.1 surround sound upgrade package and as such, is geared for just that. The minor flaws do not detract from the overall value and quality and signify personal preference rather than poor design decision. 



# Handspring Visor Deluxe

John Gillooly bounces up and down on the Springboard

<p><b>specifications</b></p> <ul style="list-style-type: none"> <li>• 16MHz Dragonball EZ processor</li> <li>• Palm OS</li> <li>• Springboard Slot</li> <li>• USB cradle connection</li> <li>• <a href="http://www.handspring.com/au">www.handspring.com/au</a></li> </ul>	<p><b>front elevation</b></p> 	<p><b>back elevation</b></p> 	<p><b>side elevation</b></p> 
<p><b>price</b></p> <p><b>\$519.00</b></p>			

Normally we at atomic would keep away from PDA reviews. Let's face it, you can't overclock them, the games are basic and most of us get more use from our ICQ contact list than the Address book feature of a PDA. The Handspring Visor is, however, so much more than your normal PDA.

The team behind the original Palm Pilot has created the Visor. Palm was bought by US Robotics (which was in turn bought by 3Com) and the team left to form Handspring, taking with them a license for the Palm Operating System. The resulting series of products launched in the US last year, and have recently reached Australia.

Because it uses the Palm OS, the Visor contains all the functions that have made Palm the market leader in PDAs. The interface is simple, driven by a stylus and touchscreen combination. The Visor comes with an inbuilt address book, email client, calculator and world time software. Text entry is via Palm's patented Graffiti software, which recognises characters written on the screen with the stylus. If this is too much then there is also a small keyboard for use with the stylus as well.

Interface with the PC is via an included cradle that connects via USB. Once you have installed the software onto your PC synchronisation is easy, you simply sit the Visor in the cradle and push a button. This activates the software and, a few seconds later, your Visor is updated. This works with personal data and new programs, which can be freely downloaded from the Internet. The software can also be set up to synchronise with Outlook to keep your contacts current. Because the cradle connects via USB, the Visor is capable of recharging its batteries when connected, as well as the batteries of any attached Springboard module.

The thing that throws the visor squarely into the realm of cool is this inbuilt Springboard function. At heart this is a port that sits on the back of the Visor that resembles the cartridge slot on a Gameboy. This slot accepts cartridges, Handspring call them modules, which add all kinds of functionality to the device. The modules are open source and license free, a move that has

been consciously made to encourage development for the platform. The modules offer true plug and play functionality. When you insert a new module it automatically installs its drivers, when you remove the module the drivers uninstall. For anyone who has ever fought with plug and pray Windows devices then this is a welcome relief.

At the moment there are a wide range of Springboard modules, from additional memory and games to GPS units and MP3 players. One of the most interesting modules is due late this year and turns the Visor into a mobile phone. The large screen on the Visor makes it the perfect WAP device. An even better solution than WAP is Handspring's Blazer web browser. The Blazer browser uses a proxy server to strip graphics and reformat Web sites to display on the small screen, allowing access to a much wider range of Web sites than the normal WAP browsers.

The Springboard modules open up a huge range of possibilities, essentially meaning that the Visor can be customised to easily fit into niche markets. In the US modules have been developed to contain entire medical reference encyclopaedias and there is even a module in development which can check blood sugar levels for diabetics, all through adding a special sensor that connects via the Springboard slot. Most modules contain all the memory for the accompanying software so they can work across the Visor range.

There are a wide range of Visor models available. The version we have looked at is the 4-bit grey scale display 8MB Visor Deluxe but a 2MB version is available for \$349 as well as colour and slimline models. The Visor Deluxe uses a 16MHz Motorola Dragonball EZ processor and is powered by two AAA rechargeable batteries. The Visor is a highly interesting spin on the normally boring world of PDAs, made even more special by the inclusion of the open source Springboard technology, which allows for a huge range of flexibility and enhanced functionality for years to come.





## reviews

&gt; ATX-4378C Aluminium Case &amp; FireWire/USB Combo Card

# ATX-4378C Aluminium Case

Looking very similar to the Lian Li case we reviewed in issue 2, the ATX-4378C is another box designed with the performance user in mind. Aluminium has again been utilised for this case, making it both ultra light in weight and appealing to the eye.

This case has a couple of innovative features that the Lian Li case was lacking, most notable of these being the shrouded fan that is mounted in such a way that it blows directly on to the CPU heatsink fan. This is a very practical feature being perfect for supplying fresh air to your CPU, and a feature that other case manufacturers would do well to incorporate.

Another feature we rarely see in home PC cases are the PCI card holders. These small spring-loaded arms swing down over the top of each card mounted on the motherboard, holding them securely in place. These are especially handy for people who are always moving their cases to LANs.

While the case does have the unique CPU cooling fan, it is sorely lacking in other cooling fans. There is one other fan mounted in the middle of the case, that seems quite useless, as it isn't bringing fresh air into, or taking warm air out of, the case. Instead, it just churns up the already warm air within the



## specifications

- 4 x 5.25in, 2 x 3.5in external and 1 x 3.5in internal drive bays
- Colours: ivory, violet, black, silver and gold
- [www.skyhawkgroup.com](http://www.skyhawkgroup.com)

## price

**\$380.00**

case, rendering it pointless.

Also, after a brief lap of the office with the case, the general consensus was that it wasn't quite as nice looking as the Lian Li, with the feeling that the ventilation holes in the front spoil the clean look of the aluminium.

While it does have some redeeming features, the poor cooling and less than gorgeous appearance hold it back from being a Lian Li beater, even considering that it retails for around the same price as the Lian Li, but comes without a PSU.

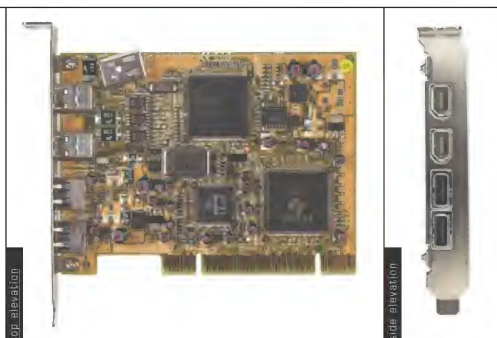


# FireWire/USB Combo Card

The IEEE 1394 high-speed bus standard, otherwise known as FireWire, has been largely overlooked in PCs, giving way to the now ubiquitous USB standard. With the PC industry providing more USB hardware, the time is now ripe for Apple's superior technology to enjoy similar support. While riding on the back of USB, the recent surge of interest in FireWire owes a lot to the changing role of the PC in the realm of multimedia, particularly digital video. Belkin has been involved in computer and electronic connectivity for over a decade with a current focus on USB and FireWire. Understanding the need to provide PC users with a platform to utilise FireWire, the FireWire/USB Combo card is offered to make it affordable and convenient.

The FireWire/USB Combo card provides two USB ports and two FireWire ports at the rear of a standard PCI card. An extra FireWire port is located on the board for internal connections. Also included in the bundle is a 6-pin to 4-pin FireWire cable. As is the standard, USB provides a transfer rate of 12MB/s while FireWire rips through at approximately 400MB/s.

The card was physically high quality and installed quickly and easily. The increasing use of PCs in home entertainment has produced a need for high data transfer rates. This has placed FireWire at the centre of attention with the 'hot' plug and play convenience combined with the enormous 400MB/s transfer rate and the ability to handle two simultaneous channels allowing for high quality audio and video. This is shown by the release of



## specifications

- Transfer: USB 12MB/s; FireWire 400MB/s
- PCI card, 3 x FireWire ports (one internal), 2 x USB ports
- [www.belkin.com](http://www.belkin.com)

## price

**\$199.95**

major digital video and digital cameras supporting FireWire.

Aware of this, Belkin has provided a copy of MGI's Videowave III video editing package. Videowave III is a functional yet standard editing suite that can handle basic home video production.

With more manufacturers turning towards FireWire, consumers can expect to see CD drives, hard drives and removable drives supporting the FireWire standard in addition to the increasing number of digital video devices. Overall, Belkin has made the ultra fast FireWire an accessible piece of technology with some USB thrown in. For those with a definite need for FireWire and USB ports the Combo card is reasonably priced while also satisfying those looking to upgrade from their SCSI, IDE or USB devices.





**ADVERTISING**



**ADVERTISING**



# Iomega Predator

John Gillooly checks out the best looking burner around

## specifications

- Portable USB CD-RW drive
- 4x Write, 4x Rewrite, 6x Read
- Adaptec Easy CD Creator 4.0, Adaptec DirectCD 3.0, MGI PhotoSuite, Iomega Quik Sync 2 software Trial, Musicmatch Jukebox Plus and Adobe ActiveShare.
- USB 1.1 connection, with future upgrades to USB 2.0 and FireWire
- [www.iomega.com](http://www.iomega.com)



## price

**\$665.00**

The sleek lines and translucent blue appearance of the Iomega Predator drive indicate the potential of it being a kickarse piece of hardware. The thought of having such a good looking piece of equipment sitting on top of your case at a LAN is a very tempting idea indeed.

The predator is the latest in a line of CD-RW drives from Iomega and it is, at heart, a reskinned Zip CD.

The Predator is a USB CD-RW drive rated at 4x write, 4x rewrite and 6x read. This seemingly low speed is a function of the USB 1.1 connection, the actual drive being capable of 8x write, 4x rewrite and 32x read. Iomega are planning to release add-on Firewire and USB 2.0 attachments to take advantage of the full potential of the drives.

The Drive comes bundled with some very handy software, including Adaptec Easy CD Creator 4.0, Adaptec Direct CD 3.0, Adobe ActiveShare and Musicmatch Jukebox Plus. The inclusion of Musicmatch Jukebox plus is a big bonus as it is the full registered version of one of the most popular audio software packages around.

## Putting it through its paces

With 12x internal burners rapidly dropping in price, the Predator is up against some tough competition. The main benefit of the drive is its portability. The USB interface is meant

to enhance the plug and play nature of the drive, the theory being that all you need to do is install the software, plug in the drive and start 'backing up'. With these dreams of portable backup nirvana we eagerly set up our Athlon testbench with a fresh copy of Windows ME and all the latest drivers. Closely following the instructions provided (with memories of wrongly installed USB devices bearing down on us), plugged in the drive and rebooted.

The drive was detected as a second CDROM in Windows explorer. Unfortunately we couldn't get the drive to be detected by Easy CD Creator, Direct CD, Musicmatch Jukebox or CD Speed 99. We then tried every trick in the book to get the drive up and running, from plugging it into another USB slot to uninstalling and reinstalling the drivers. When we could get it running on the testbench it would seize up midway through a read or write operation.

Somewhat disheartened by these developments, we plugged the drive into a spare laptop and, lo and behold, it worked perfectly. This is a great example of how fickle the installation of USB devices can be.

Once the drive was up and running we ran up CD Speed 99 ([www.cdspd2000.com](http://www.cdspd2000.com)) and put the drive through its paces. The data read speed averaged 6.35x and peaked at 6.5x, the audio read speed was 5.74x. A rip of a 74-minute audio CD to wav files took just under 14 minutes.

The drive refused to work with our CD Speed 99 write tests, so we resorted to manually timing a burn of a 60 minute audio CD with Adaptec Easy CD Creator. This burn took 19 minutes to complete. To check the stability of the drive we reran the burn test while copying large files from the network and playing an audio CD. This had no effect on the burn time.

The Predator is a fickle beast. Once the drive is running it works like a dream, with admittedly slow performance. The big worry is the problems we had installing the drive on a clean system. For a drive whose major selling point is its portability then we begin to doubt how portable it really is, hopefully the Firewire or USB 2.0 adapters will be a lot more user friendly, even with a much higher cost. On the plus side, it is one good looking piece of hardware, and would look impressive sitting on top of your heavily modded case. But unless you are really in need of the portability then there are many more cheaper, faster and more stable internal drives available for a lower price.

atomic  
**6.5/10**

## reviews

&gt; USB Direct Connect &amp; Amacom Flip Disk

# USB Direct Connect

 <p>front elevation</p>	 <p>back elevation</p>	 <p>front elevation</p>	<p><b>specifications</b></p> <ul style="list-style-type: none"> <li>• Transfer: 12MB/s</li> <li>• TCP/IP; IPX/SPX2 x 5m USB cables</li> <li>• <a href="http://www.belkin.com">www.belkin.com</a></li> </ul> <p><b>price</b></p> <p><b>\$129.95</b></p>
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Home and small business networks are the latest to have a USB revamp with Belkin's USB Direct Connect. In order to take advantage of the USB capabilities and make it a contender to the already established network market, the USB Direct Connect will have to be portable, fast, convenient and affordable.

The Direct Connect supports TCP/IP and IPX/SPX standards with a USB maximum data transfer of 12MB/s. The package contains 2 x 5 metre USB cables with a small 2-port hub. The curvy pocket-size hub is about the size of a small mobile phone and is clearly designed for portable use. The hub also consists of three LED lights powered through the USB.

In order to ensure the marketability of their product, Belkin had to make the Direct Connect faster, more practical and easier to install than a couple of Ethernet PCI cards. Installation is entirely straightforward with a simple step-by-step manual,

accompanied by a lightweight network set-up wizard. I tested a 2MB uncompressed file transfer, which took approximately 8 seconds with a 2MB compressed file taking approximately 9 seconds. Games were highly playable without any problems making the Direct Connect a viable option as the backbone in any home gaming network.

Up to 8 PCs or laptops can be connected to a single host, which of course requires more Direct Connect packages to be purchased. A major restriction to the USB Direct Connect is the 10 metre maximum distance. At almost \$130 a set, this home network is a little pricey. But the ability to connect two systems together quickly and easily, with the only requirement being a USB port, is reason enough to purchase the Direct Connect.

**atomic**  
**8.5/10**

# Amacom Flip Disk

The Flip Disk can be connected to either a PC or laptop via the use of IDE/USB and PCMCIA. The 'flip' in Flip Disk refers to the unique fold out design of the PCMCIA card from underneath the drive. Aside from its funky design, the drive is very light, weighing in at under 200g. Slightly longer than a standard floppy drive, the Flip Disk is 145 x 87mm and approximately 30mm thick. These dimensions ensure the mobility of the Flip Disk, made easier with an included carry case.

Spec-wise, the Flip Disk is available between 6 and 18GB of uncompressed storage. Transfer rates are reported at around 1.2MB/s through the parallel port with PCMCIA at 6MB/s. At 4200rpm and an average seek time of 13ms, the Flip Disk is adequate enough for general storage and application requirements. Connectivity is well thought out, providing IDE to USB and IDE/Printer to parallel alternatives. Drawing power from either the PCMCIA socket or through the keyboard pass through when interfaced through the parallel port, the Flip Disk does not require an external power source.

Windows reports the drive as a standard local disk, which can be accessed through Windows Explorer. ThreadMark tests reported a 2.3MB/s transfer rate with 93.3 per cent CPU usage compared to the internal ATA/66 drive results of

 <p>back elevation</p>	 <p>front elevation</p>	<p><b>specifications</b></p> <ul style="list-style-type: none"> <li>• 6GB 4200 RPM</li> <li>• Interface: PCMCIA, Parallel Port</li> <li>• Transfer rate: 1.2</li> <li>• 6MB/s for Parallel</li> <li>• PCMCIA respectively</li> <li>• <a href="http://www.bbits.com.au">www.bbits.com.au</a></li> </ul> <p><b>price</b></p> <p><b>\$799.00</b></p>
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5.1MB/s with 88.9 per cent CPU usage. This results in more than adequate performance for the tasks that may be required by the upwardly mobile user.

The package provides enough alternatives for just about any PC set-up to take advantage of. Without any real muscles to flex, the Flip Disk is directly aimed at secondary storage and mobile laptop use. While some may find the price tag a little high, those wanting a stylish solution to portable storage should find it a suitable choice.

**atomic**  
**8/10**

# AMD 1.33GHz Athlon

Bennett Ring takes AMD's fastest and puts it into overdrive

## specifications

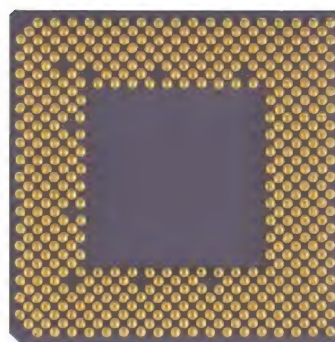
- 0.18 micron
- 1.75V CPU voltage
- 10 x 133MHz FSB = 1.33GHz
- Maximum thermal dissipation = 73W
- L1 Cache = 128KB
- L2 Cache = 256KB
- 37 million transistors
- Die size = 120mm square

## price

**\$630.00**



back elevation



The AMD Athlon CPUs are widely regarded as being the most powerful processors for today's software. In head to head benchmarks, the Athlon range consistently beats the higher clocked Pentium 4, yet retails for a fraction of the cost. With the release of the 1.33GHz Athlon, AMD has shown that this powerful CPU design still has a little room to grow.

Running on a 133MHz front side bus with a 10X multiplier, the 1.33GHz Athlon uses the same architecture as the rest of the Thunderbird-based Athlon family. Manufactured using a 0.18 micron process, the 120mm square chip contains 37 million transistors, and includes 128KB of L1 cache and 256KB of L2 cache. The default voltage for the 1.33GHz Athlon is 1.75V, which still leaves you a little room for increasing the voltage to 1.85V when overclocking. The Athlon sets new standards in raising case temperatures; pumping out a theoretical maximum of 73 watts makes the use of an AMD approved heatsink fan combination essential.

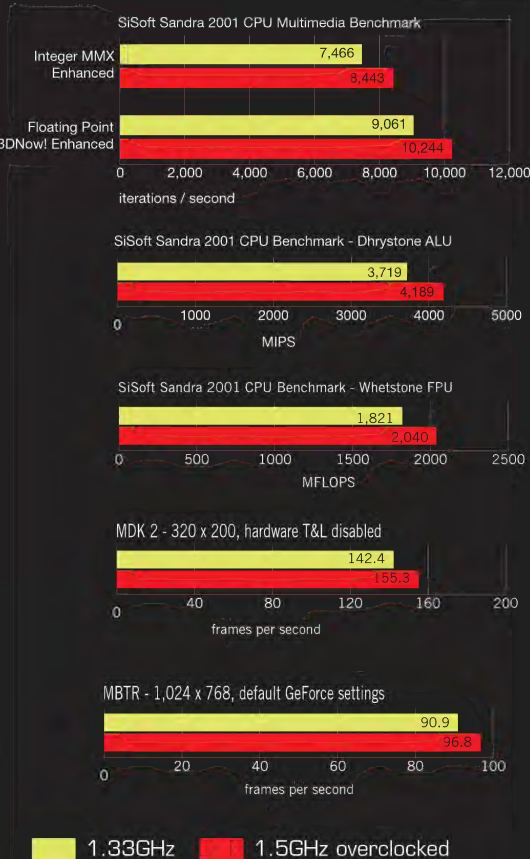
Using FSB and multiplier overclocking, I overclocked the 1.33GHz up to 1.5GHz (137MHz FSB x 11X multiplier). Even at its default speed of 1.33GHz, this CPU is a Pentium 4 1.5GHz slayer, as long as the applications haven't been optimised for the P4's SSE2 instructions. Luckily for AMD, there isn't a lot of SSE2 optimised software around at the moment.

Retailing at around \$600, the 1.33GHz Athlon raises the bar for CPU performance while still remaining affordable. This chip looks set to be one of the final releases for the Thunderbird Athlon core, with the move to the new Palomino core scheduled for the beginning of quarter 3. Until then, the Thunderbird Athlon still offers the most bang for your buck, making the 1.33GHz Athlon arguably the most powerful processor currently available to PC users.

## BENCHMARK GRAPHS

All tests were run at 1.33GHz (133MHz FSB x 10X multiplier) and the overclocked speed of 1.5GHz (137MHz FSB x 11X multiplier) using a SY-K7VTA Pro motherboard and our standard reference components.

## technical details





## reviews

&gt; Creative CD-RW Blaster 121032 &amp; PC Case Gear Neon Kit

# PC Case Gear Neon Kit



## specifications

- four different colours
- 3 watt power draw

## price

**\$65.00**

So you've cut a whopping great hole in the side of your case, before installing a sexy new perspex window, but you still can't see the interior as well as you'd like. There is only one solution for the hardcore case modder – Neon! Yes, it does sound totally over the top, but the end result is a case that will put any Vegas casino to shame. The first Neon kit to enter the atomic Labs is the kit produced by PC Mods, and distributed in Australia by PC Case Gear ([www.pccasegear.com](http://www.pccasegear.com)).

Retailing at \$65 for the 10in version and \$79 for the 15in version, these lights come in at the very affordable end of the pricing spectrum. For your money you are supplied with one light, a pass through Molex power connector and double-sided adhesive pads for mounting. A sturdy rocker switch is included, as well as a handy sticker/stencil used to cut the hole for the rocker switch. The light is already wired up, unlike some of the original PC Neon lighting kits that were released.

Installation of the unit is total child's play, taking around 10

minutes. Simply find a suitable position for the light, stick it into place and attach it to your PSU. The hardest part is cutting the hole in the front face of your case for the switch, although the included stencil makes this a simple affair. Drawing a meagre 3 watts, you won't need an incredibly beefy PSU to power these lights. Neon lights throw off almost zero heat and as a result we didn't notice any increases in case temperatures with a single 10in kit installed.

For those that prefer their PC to remain the boring beige box that looks like every other PC on the planet, these kits are useless. However, if you're looking to spruce up your case and have a perspex window or some other type of viewing window into the interior of your case, the PC Case Gear Neon Lighting kit is very affordable, pathetically easy to install and will leave your case looking more like an alien atmospheric entry capsule than a boring work station.



# Creative CD-RW Blaster 121032



## specifications

- 12x Write, 10x ReWrite, 32x Read
- Bundled with Nero 5.0, Prassi abCD, Creative LAVA and FlipAlbum CD Maker
- [www.creaif.com](http://www.creaif.com)

## price

**\$449.00**

12x CD burners are fast becoming the current standard. Apart from some special exceptions like Yamaha's 16x burner and portable burners (whose speed is limited by their interface) the majority of the CD burner market is sitting at 12x. Creative's latest entry is the CD-RW Blaster 121032, a tray loading IDE drive rated for 12x Write, 10x ReWrite and 32x Read.

The drive was tested using CDSpeed99 ([www.cdspeed2000.com](http://www.cdspeed2000.com)) and it performed admirably. The drive writes at exactly 12x, the data read test peaked at just under 32x and averaged 24.3x. The audio read test averaged 22.2x and the drive was capable of ripping a 74 minute audio CD to wav files in three minutes 20 seconds.

In the never-ending battle against buffer-underruns the CD-RW Blaster uses SANYO's BURN-Proof technology that suspends data transfer when a buffer underrun starts to happen. This technology is becoming more and more widely

used as a highly effective way to ensure successful burns.

The drive comes bundled with Nero 5.0 for burning and Prassi's abCD packet writing software (packet writing software allows a CD-R or CD-RW to appear as a writeable drive). Also included is the Creative LAVA MP3 player and the FlipAlbum CD Maker, a software package for creating image collections on CD. The drive includes a soft CD carrying case with a funky liquid filled cover; obviously aimed at being the CD storage equivalent of a Lava Lamp. In reality all it does is induce paranoia that it will leak toxic sludge over your precious CDs.

Overall, the Creative CD-RW Blaster 121032 is a solid package. The drive performs to its specifications and the inclusion of BURN-Proof will minimise the stereotypical coaster production. As 12x CD burners become commonplace this drive will continue to sit near the head of the pack.



# ASUS A7A266

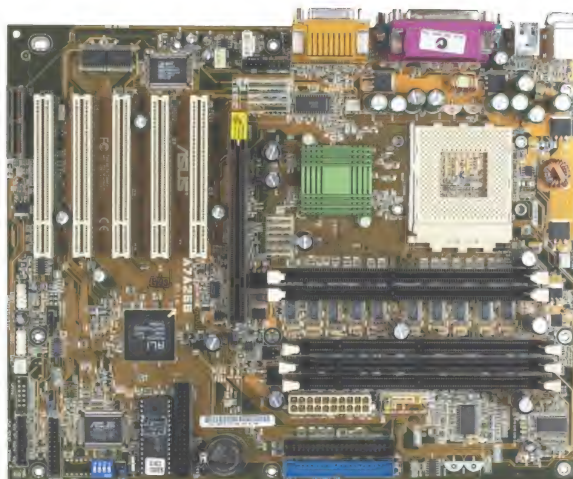
John Gillooly makes sense of this all-purpose Socket A mobo

## specifications

- Socket A motherboard for 100MHz Athlons and Durons and 133MHz Athlon processors
- Two DDR RAM and three SDRAM slots
- UDMA 100 support
- JumperFree mode
- ALiMAGiK1 chipset
- [www.achieva.com.au](http://www.achieva.com.au)

## price

**\$390.00**



the hardware; we contacted the distributor, who in turn contacted ASUS in the pursuit of a solution. After several emails and phone calls ASUS got back in touch and sent us the latest driver updates. After reinstalling windows and running the new drivers we found the same trends. For the 100MHz FSB Athlon the Sandra DDR results were only about five to six percent higher than the SDRAM, but in both the MBTR and Quake 3: Arena tests the DDR was around one and a half per cent slower than the SDR. For the 266MHz FSB Athlon the Sandra results showed a greater difference between the DDR and SDR and the MBTR results showed an 11 per cent increase. The

At first glance the A7A266 is the ultimate upgrader's motherboard, sporting both SDRAM and DDR RAM slots. This should be the board for someone who wants to grab an Athlon or Duron now and use their existing SDRAM until DDR drops in price. The simple fact is that the board hides a dark secret, one that demonstrates some valuable lessons about the need for comprehensive benchmarking.

In the last issue of atomic we put SDRAM and DDR RAM head to head using two different motherboards and found out

Quake 3 results showed a whopping difference of two frames per second.

These somewhat surprising results would not have arisen had we not benchmarked the motherboard. If we had of run the board with only one memory or CPU type (or not at all) we would have come up with the logical and obvious conclusion that the board ran the various combinations of FSB and RAM at the expected speeds.

This has big implications for the upgrade market that the board is aimed at. If you want to move to a 100MHz FSB Athlon or Duron then you will be better off getting a more specialised motherboard like the Asus A7V133 and using PC133 SDRAM. If you are

**“...in both the MBTR and Quake 3: Arena tests the DDR was around one and a half per cent slower than the SDR.”**

what the actual performance differences were. In the SiSoft Sandra memory benchmarks we expected a difference of 16 per cent between Integer ALU results and 36 per cent between FPU results. The expected difference between the Quake 3 results was in the range of six to eight per cent.


Keeping this in mind we started testing the A7A266. Initially we ran the tests using a 100MHz FSB 1GHz Athlon and 128MB of PC133 SDRAM, coming up with our first set of results. We then swapped the SDRAM for 128MB of PC2100 DDR and ran the same tests. The difference in the test results was negligible, with only one or two frames difference in Quake 3: Arena and Mercedes Benz Truck Racing (MBTR). We then ran the same tests using a 133MHz FSB 1.33GHz Athlon. The results were more like we initially expected, however they were still pretty close.

## WTF?

Feeling concerned that there may have been a problem with

looking at one of the recent 266MHz FSB Athlons, then using the A7A266 with SDRAM is a good option, as you can upgrade to DDR at a later point.

Stepping away from the speed issues the A7A266 is a nice, fully featured board. There were no major problems when installing software or hardware, and everything ran well, even if it didn't show the expected difference between the types of RAM. The board does lack the ability to adjust the multiplier of the CPU, allowing overclocking via the front side bus only, which was very disappointing for an ASUS board.

Despite its appearance of flexibility the A7A266 is a motherboard that is suited to specific combinations of hardware. Now that Asus have discontinued the A7M266 the A7A266 is the board of choice for the Asus lover who wants a 133MHz Athlon. The lack of multiplier adjustment is a worry for those who overclock, but many other boards out there will more than adequately fill their requirements. 

atomic  
**6.5/10**





# games

It has been a great month for PC game releases. In fact, three of our four reviews received Hot Awards. John Gillooly wonders what the hell is going on?

That time has arrived, with *Black and White* finally hitting after several years of development. This was accompanied by a flurry of last minute activity on the screenshot posting front, designed purely to push *Black and White* into a tie with *Tribes 2* and Britney Spears for the coveted "most images on the Web" award. Hopefully the release of *Black and White* won't herald a paradigm shift from giant robot games to giant animal games.

The hype aside, this month has given us many great games, most noticeably *Black and White* and *Serious Sam*. Both games set out to do very different things, and both are successful for a range of reasons. As we look over the history of PC gaming we see many landmark titles, both those that redefine a genre and those that simply get it right. *Serious Sam* is by no means a genre redefining game, if anything it is a throwback to the shooters of old, but it succeeds admirably in achieving what it set out to do. It is an absolute hoot to play. As shooters shift more and more towards dark, brooding games with complex AI, the bright, fast chaos that *Sam* delivers in copious amounts is refreshing to say the least.

*Black and White* sets out to achieve things on a much higher plane. Its aim is to redefine not only a genre but also games in general. Games that accomplish this are few and far between, despite every second game in development having a unique twist to it. Over the past few years a huge concentration has been put on graphics and animation, but the amount of time devoted to the rest of the game has often suffered.

Molyneux in particular has a history of providing the whole package. One of the standout games of his reign at Bullfrog was *Magic Carpet*. One of the first games to require the use of keyboard and mouse, *Magic Carpet* combined truly innovative gameplay with an amazing graphics engine for its time. Deformable terrain, true 3D movement, fast speeds and a completely new combat system were combined to create a landmark game.

Another of the landmark games from Bullfrog was *Syndicate*. *Syndicate* was a weird hybrid of tactical and action based, with a dose of resource management thrown in. Again it was a genre buster and a game that has not been bettered since.

The list of classic Bullfrog games is great, and they were for a long while one of the companies you could trust to deliver a quality, innovative product (apart from high octane but we will ignore that one). Since Molyneux left, Bullfrog has unfortunately lost some of the magic of days gone by. The big question is whether Molyneux has transferred this magic to Lionhead, and the answer is contained in Des McNicholas' great review of the game over the next few pages.

## Where's Tribes 2?

We were hoping to bring you a *Tribes 2* review this month. Unfortunately we decided that the early versions we received were not ready for review. The major issue was the lack of servers for multiplayer. A game like *Tribes 2* needs to be examined in the terms of multiplayer, because that is its major focus. This is not just looking at things like the games networking code, but examining the environment as a whole. Games like *Quake 3*, *UT*, *CounterStrike* and *Tribes* live and die based on the community. It has to be fun, and not full of the bitching and moaning that can plague online gaming at times. Of course the game itself has to be good, but it is these more intangible qualities that determine the longevity of a game.

Another thing worthy of notice is the explosion of interest in the upcoming game *Operation Flashpoint* since the release of the single player demo. In a move reminiscent of the original *Carmageddon* demo, within a week there had been new missions and a variety of "patches" designed to add new weapons, let you play on the Russian side, change the mission to night time and even add new driveable vehicles. This bodes well for *Flashpoint* having a major impact upon release. If you want to get your hands on these goodies, drop by the great Australian *flashpoint* site [www.operation-flashpoint.net](http://www.operation-flashpoint.net).

You'll notice a distinct lack of console games in this month's reviews section, but it wasn't through lack of trying. The sad reason is that quality next gen console games are few and far between at the moment. The DC seems to have hit a release lull, whilst the teams trying to create mega-hits for the PS2 are still coding away furiously. So, for the short term at least, PC gamers continue to have a wider selection of new, top-shelf games to choose from than their console comrades. Hopefully, as the PS2 begins to heat up and the console market gets two new platforms, things will change in a big way.



games **pc**

&gt; Black and White

# Black and White

Des McNicholas adds some colour with his grey matter to Black and White



In an industry renowned for over-selling products before the first line of code has been written, the embryonic Black and White still managed to reach new heights of hyperbole, second-guessing, and blind faith. Peter Molyneux's name alone was enough to kick off the frenzy of anticipation, and the excitement was maintained through timely leaks, interviews and screenshots. As a result, Black and White received the kind of attention usually reserved for the next great FPS, and it soon became clear that this would have to be more than just another RPG.

While the three year development cycle dragged on, Black and White consistently polled high on mainstream lists of most-wanted games, suggesting a huge potential market. Naturally, having raised expectations to such levels, Lionhead Studios placed itself under enormous pressure to produce a genuine cross-genre winner, knowing that gamers would be unforgiving if their hopes were dashed. Worry not! I am pleased to report that, on almost every level, Black and White has set new benchmarks for game development. This is quite simply the best game I have played in years.

## It's a miracle

At first glance, Black and White's story seems straightforward. Players take the role of a God, with responsibility for worshipper welfare and pretty much free reign to do as they please. More believers

equals more power, and belief can be inspired through good works, evil acts, or a combination of both. Increased power means access to more miracles and a wider physical span of control, thereby continuing the cycle. Implemented well, with a villain thrown in, many players would have been happy enough with that, but there's far more to Black and White, with options becoming increasingly complex as the game progresses.

Things are pushed along by a compelling storyline, in which the aim is to advance through various lands and defeat the arch-rival Nemesis, but the way things actually pan out is driven by the hundreds of small decisions players make along the way. And the influence of those decisions is not just immediate, as their impact is gradually reflected in subtle changes to the environment and the way characters behave. In reality though (and here's the trick) Black and White is more about the players themselves than the characters they play.

①\* Lionhead weren't lion when they said we'd be lion on the floor with amazement

① Turtle God contemplates ending it all



Environment is everything in a game of such scale, and Black and White does a remarkable job of dragging you into the story. Indeed, once things take off, players actually shape the game world and the story rather than just participate in them. This isn't a game that treats sights, sounds and actions as discrete components, only bringing them together for the more exciting bits. It certainly looks stunning, sounds great, and offers plenty to do, but it's the subtle and continuous combination of those things that makes it such an immersive experience.

The sea, for example, doesn't look realistic, it sounds right too and merges onto the beach flawlessly - while seagulls cry overhead and the light fades from the day. If you take the path of evil, your values are slowly mirrored in darkening skies, decaying structures, and sombre music. Regardless of your actions though, the wider game world just plods on relentlessly around you, adding to rather than detracting from the feeling of participation. Throw in a very discrete interface and some high quality cut scenes to flesh out the story, and this is a world you can readily believe in.

### Acts of Gods

The Black and White game world revolves around small land masses, each of which contain village-based communities. It does have a simple resource management element, in that wood, grain, livestock and fish are all necessary to sustain life and provide the strength needed for worship, but gathering supplies certainly doesn't dominate play. Whilst one village will have reasonable levels of belief in their God at the start of the game, others need convincing, which is achieved through the use of both spectacular and mundane miracles. Some miracles provide the staples of life, while others are of the plague, pestilence, and water-to-wine variety.

Naturally, the spectacular becomes the mundane after a while, so the emphasis is always on expansion and increased power. God-like, players can roam all over the map, although they can only take action when a sufficient number of the locals believe in them. This situation calls for some very innovative methods of exercising power, and means that players



❗ The Gods appear pleased

❗ Deforestation for fun and profit

ignore world events at their peril. Lionhead have also given the concept of advancing a new twist, with the various lands (levels) connected by spectacular vortexes, into which players must physically cast whatever they can salvage from the previous land - which includes people and spare miracles.

Being omnipotent isn't all it's cracked up to be! Having been adopted by a village after saving a boy foolish enough to swim with sharks, players are faced with the eternal conflict between good and evil; between exercising raw unbridled power, and satisfying the spiritual and material needs of the faithful. Tricky choices arise very quickly, and Lionhead have been good enough to provide the two sides of your conscience to argue the toss on screen. They might seem a little unnecessary at first, but the talking heads actually form the basis of the tutorial you have when you're not having a tutorial.

### Good Godliness

At first, the aim is to come to grips with your Godliness, the needs of the village, and the wider world. The villagers will look after themselves to a fair degree, setting about building a temple to your greatness, and your early role is one of helping out with building materials and watching the work. The temple becomes the centre of your power, containing all the





## games

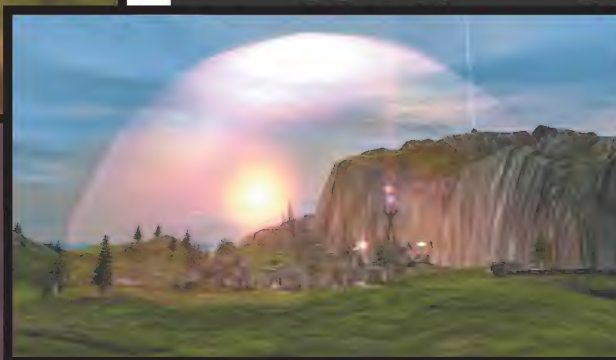
&gt; Black and White



records, statistics and information necessary to keep things running smoothly. Cleverly, one of the rooms also acts as the control panel, through which games can be saved and loaded, settings changed, and progress tracked.

While construction continues, your duelling consciences will encourage you to explore the world and generally start acting like a God. Floating scrolls herald a job to be done, with a simple click taking you to the villager or problem in question. How you react is entirely a matter for moral judgement, and you'll have to wrestle with your conscience at every turn. If some villagers refuse to believe in you, for example, you could win them over by dropping wood next to their homes, or by flattening the whole area with a shower of boulders. Loved ones could be rescued, or thrown out to sea. You'll probably convert them either way, but the long-term results might be very different. After some 'basic training', it's time to get to the heart of the game - selecting a creature.

Creature control has been the most anticipated aspect of Black and White, as tantalising images of cows, monkeys and tigers captured the imagination of



gamers around the world. Bearing in mind that you're just a hand (albeit of God!), your creature is the main way you interact with your followers, and the only means of influencing and converting the villages and people currently beyond your control. Having chosen an immature creature early in the game, you have to satisfy its needs for health, food, discipline, love and, most importantly, learning.

The life-like nature of the creatures in Black and White almost defies description. Most obviously, they are visually very impressive, with realistic appearance, mannerisms, and actions. Facial expressions,

gestures, and general movement detail are also first rate, to the extent that a creature's personality is clear at a glance. Pampered pets will be overweight, dopey and lazy, while those from the school of hard knocks will be lean, aggressive, and menacing. This illusion of life is enhanced by battle wounds that persist throughout the game, bruises that gradually clear up, and the visible aging of creatures with the passage of time.

Remarkably, just like the world around it, your creature's overall appearance will gradually change to reflect your style of play. Things stay cute if you're a nice God (a noble aim but difficult to maintain for the long haul), while, Dorian Gray-like, your once lovable pet slowly transforms into a hideous beast if you choose the path of evil. The change is very subtle and very slow, but the ultimate effect is outstanding. You must live with the decisions you make, and I strongly encourage players to stick with those decisions rather than reload and try alternatives. Watch the game develop around your actions, right or wrong, and experience Black and White as it was meant to be experienced.

### Smart Kitty

Looks and personality aside, the creatures' ability to learn is unmatched by anything yet seen in computer games. Show your creature something often enough, like collecting wood or using a particular miracle, and it will learn how to do it at will. Feed it people instead of sheep, and it will get a taste for them. Get it into fights with other creatures, and its boxing skills will gradually improve. I accidentally (honestly!) set mine on fire with a fireball, and it sprinted straight into the



sea to put it out! It takes a lot of time and effort to train your creature, but it takes a smart beast to spread the word in new villages, and you'll need its help to defend what you already have. As a bonus, learning acquired in multiplayer sessions can be ported back to the single player game, blurring the boundaries between the two modes of play.

Fortunately, your creature generates miracles from within, without any need to draw on the faith of the population - very handy if your disciples choose to stray from the true path! Through the innovative 'leash of learning' concept, players can demonstrate an action, confirm that their creature has gotten the hang of it, then tie it to the nearest tree to let it crack on with the task. As it develops, your creature will be a living symbol of your power; able to spread joy or wreak havoc, with its ever increasing abilities matched only by its expanding size. Make no mistake - this is no PC Tamagochi. Creatures are an absolutely integral part of the Black and White experience, and ensuring that they become a help rather than a hindrance is the fundamental task in the game.

The interface, or lack of it, is yet another example of how this game stands out from the crowd. It's minimalist to say the least, yet players will be amazed at how much they directly and indirectly interact with the game world. Molyneux and his team set out from the start to remove all clutter from the screen, which meant no click on menus, borders, or compulsory keystrokes. Allowing for a little minor cheating - such



① Serf's up

as the use of Temple rooms to store traditional on screen information, and a couple of floating symbols - they have succeeded very well. So well, in fact, that the interface is part of the game in its own right, leaving the uncorrupted computer screen as a window on the world, free of health bars, inventories, maps or statistics. It certainly takes some getting used too, but you won't want to go back.

### Hand of God

Black and White's basic game functions are straightforward and traditional. Click to carry out an action, double click to move quickly, and right click for special commands. Both buttons together provide the zoom function (although a mouse wheel is a lot easier), and a combination of click and drag is used to rotate and look up or down. After that, it all gets interesting. Normal movement is achieved by dragging yourself across the landscape - click a point and drag the mouse towards you, or push it away. But wait, there's more! Lionhead have also successfully implemented Gesture Recognition Technology. Draw a heart with the mouse, and the healing spell is activated; draw a spiral, and the food spell is in your hand; need wood or a fireball? - just sign for them! It's simple, it works, and it gives real substance to the hand of God.

Having played the final product, I am more than happy to add to the hype. Lionhead Studios have achieved nothing short of a brilliant result with Black and White. This is an almost faultless game, in terms of story, interface and stability, particularly once players adjust to the novel controls. Boasting innovations at almost every level, this game crosses so many genres it's difficult to place it in a box. Black and White combines elements of strategy, resource management, FPS, and RPG into a single game that's visually stunning and straightforward to play. For that reason, this game will appeal to players of all persuasions, and 'genre snobs' should take a chance on something new - you will be amazed!

### All in a Deity's Day

Black and White uses quests and miracles to keep things moving, forcing players to make decisions with long-term implications. A quick flight around the landscape will generally reveal floating gold and silver scrolls that players can either read or ignore. Gold scrolls deal with the essential tasks that drive the story itself, whereas silver scrolls generally relate to some mini quest, such as a plea to provide resources or save drowning fishermen. You can advance to the next level without completing all silver scroll tasks, but you'll miss out on a lot of fun and possibly miss opportunities to increase your power. Some of them, such as a call for help from a group of incessantly singing sailors, are clearly designed to test the patience of the most saintly God. Like Morris Dancers, they clearly had to be destroyed!

The daily round of miracles is well handled, through a combination of those that need prayer power to work, and the special 'one-shot' variety. The first are activated by sending the population to church, while the specials pop up at random or as a result of completing silver quests. A terrific range of miracles become available as the game progresses, including fire, food, water and healing, as well as the much more interesting fireballs, lightning, teleportation, and shield. Your creature can learn to use them all by watching you at work, and well placed miracles will increase the faith of your people. Mastering them is very important, as plenty of opportunities to use them will arise as things hot up with Nemesis.

#### game details



Everything. An incredibly immersive experience that sets new standards in almost every area.



Almost nothing. The initial setup and load game screens are confusing.

**Minimum Requirements:** PII 300, 8MB video card, 64MB RAM, HDD 620MB

**Recommended:** PIII 500, 32MB video card, 128MB RAM

**Sound APIs:** Direct Sound

**Video APIs:** Direct 3D

**Developer:** Lionhead Studios [www.lionhead.com](http://www.lionhead.com)

**Distributor:** EA [www.ea.com](http://www.ea.com)





games **pc**

> Clive Barker's Undying

# Clive Barker's Undying



Bennett Ring suggests you stock up on brown trousers for this one



① These creatures have a nasty habit of teleporting directly behind you when you try to attack them

If you're a fan of getting yourself into such a state of sheer terror that you become convinced your house has suddenly become haunted and your loved ones secretly desire to feast on your brains, you would be hard pressed to find a recent game that can send you into such waves of paranoia. Over the years there have been a mere handful of games with a fear factor even approaching the underpants filling level. Enter Clive Barker's Undying, a horror themed first person shooter with one of the world's most prolific horror legends behind the sickle.

There is only one way to play Undying. Wait until late at night when your house is nice and quiet before turning off every light, engulfing your PC in total darkness. Crank up the sound, sit back and be prepared to be scared out of your wits. And scared out of your wits you shall be, for Undying is up there with the mighty System Shock series when it comes to bringing on the goose bumps.

Using the Unreal Tournament engine guaranteed Undying would have sumptuous visuals, and the dark and brooding world rendered within is simply jaw dropping in places. It all runs pretty smoothly on a medium range machine, although there is one level, the past monastery, where frame rates were pretty dismal, even on a 1GHz GeForce2 equipped machine, but thankfully this section doesn't last too long.

Clive Barker had a large hand in the creation of the creatures and characters within this nightmarish realm, and as a result they are some of the most bizarre and perverted creatures to yet feature in a game. Whilst the modelling wasn't the most advanced I'd ever seen, the creatures were all animated so fluidly that I often had to say to myself 'relax, this is just a game'. There are a wide variety of characters to interact with throughout numerous cut scenes, and

each has been imbued with its own distinct personality. The creature AI is also very impressive, with creatures fighting amongst themselves and even using team work to make sure you end up decapitated, disembowelled or just plain dead.

I've long wondered why game developers don't take advantage of a game's sound track to help create atmosphere. Obviously the same thought occurred to Undying's developers, for the ambient and creature sounds will send shivers down your spine at regular intervals. From the deep rumbling of a far off thunderstorm, to the spine tingling cry of a nearby Howler, each and every effect sounds as if it had been recorded in the depths of Hell itself.

Undying shows what a professional storyteller can bring to a game, having perhaps the strongest storyline ever seen in the first person genre, turning this into more of a first person story than a shooter. The brilliant storyline is told by way of various journals, cut scenes and puzzles, and while the game is quite linear, the strength of the story won't let you leave until you have 'read' the final chapter.

While Undying does have a few minor flaws, especially noteworthy being the almost invincible final boss, its gripping storyline will leave you with the realisation that the first person shooter genre has the potential to become an amazing vehicle for story telling, more powerful than even film or television. Fans of the horror genre should not miss Undying, and all others should really give this game a go – just make sure you play it somewhere dark and quiet so you can really immerse yourself in the horrifying world that Clive Barker has helped bring to the PC. And if you get too scared, you can always turn the lights back on...

## game details

**Totally terrifying, beautiful level design, gripping storyline, intelligent AI.**

**UT engine a tad slow in open areas, the games linearity can lead to extreme frustration if you overlook something.**

**Minimum Requirements:** 400MHz CPU, 16MB D3D or GLide compatible video card, DirectX 8.0 compatible sound card, 64MB RAM, 90MB HD space

**Recommended:** 700MHz CPU, GeForce256, EAX compatible sound card, 128MB RAM, 610MB HD space

**Sound APIs:** DirectSound, EAX

**Video APIs:** Direct 3D

**Developer:** Dreamworks Interactive

[www.dreamworksgames.com](http://www.dreamworksgames.com)

**Distributor:** Electric Arts [www.ea.com](http://www.ea.com)





# Serious Sam

Notorious mental case,  
John Gillyooly, gets serious

The bad guy in Serious Sam is called Notorious Mental. This alone should be enough to make everyone want to get this game. But for those who want to delve deeper, Serious Sam is the biggest blast of fresh air to hit the jaded genre of first person shooters since Half-Life. Just as Half-Life triggered a change from mindless blast fests to tense battles with nasty AI, Sam takes us back to the mindless blast fest, and then kicks it up a notch.

You play Sam 'Serious' Stone, sent back in time to ancient Egypt to stop Notorious Mental and save the world. At your disposal are a host of weapons, which are seemingly drawn from the annals of first person shooter history. All the usual suspects are there, pistols, shotguns, chain gun, rocket launcher, grenade launcher and one huge handheld cannon. The enemies are by and large fairly dumb, but they hunt in packs. Actually packs is not really the right term, huge rampaging hordes is much more appropriate.

If there was one word to sum up Sam it is frenetic. By the time you complete the third level of the game you will have faced over 500 enemies. By the time you have fought through the game the enemy total is well into the thousands. A special mention must be made of the Beheaded Kamikaze. In this headless, bomb wielding, screaming, suicidal ex-human developer Croteam has created one of the most disturbing and terrifying bad guys to ever grace a computer screen. From the first moment when a pack of these creatures crest a hilltop they will haunt your progress through the game and have you looking over your shoulder and waking in a cold sweat for days to come.

The game itself features a seemingly small total of 14 levels, and is being pushed as the first episode in the Serious Sam saga, however each of the 14 levels are huge, and this is not a game that you will finish in a few hours. Without revealing any of the games secrets, let me just say that Notorious Mental is one of the best end of game bosses ever. His appearance will have you scraping your jaw off the floor.

All of this action is facilitated by one of the most amazing game engines to emerge in recent years. The Serious engine can cope with huge outdoor levels, huge indoor levels and huge numbers of enemies on screen at once, all in high resolution, bright, vibrant colour and with the bells and whistles



❗ No shooter would be complete without a chaingun, and Sams is one of the best

that accompany the latest game engines. The engine is also fully scriptable and moddable, and the game ships with a map editor and a model editor. The mod friendly nature of the game should mean Sam should keep on delivering.

The multiplayer in Sam uses the tried and true dedicated server method, which should help the online scene to get established. One unique feature of the multiplayer is that there is also a four player split screen mode, and even support for DualHead and TwinView graphics cards, with monitors assigned to each player. The game also allows co-operative play, which is something that has been sadly neglected in many first person shooters lately.

Serious Sam is an amazing achievement from an unexpected quarter. Croteam should be patting themselves on the back over and over again. They have managed to put the fun back into a genre that has become lost in a miasma of multiplayer only focus and pseudo realism. Sam has raised the bar for the next generation of shooters, and hopefully it has id software running scared. We can only pray that Doom 3 has the adrenaline packed gameplay that Sam delivers.

## game details



**FUN, highly scaleable graphics engine, enormous hordes of enemies onscreen, host of multiplayer options, FUN .**



**Slightly shorter than originally planned.**

**Minimum Requirements:** PII 300MHz, 64MB RAM, 3D Accelerator, 360MB HDD

**Recommended:** 500MHz CPU, 64MB RAM, 32MB 3D Accelerator, Broadband Internet

**Sound APIs:** DirectSound, EAX

**Video APIs:** OpenGL

**Developer:** Croteam [www.croteam.com](http://www.croteam.com)

**Distributor:** Jack of All Games  
[www.jackofallgames.com](http://www.jackofallgames.com)



games **pc**

&gt; Fallout Tactics: Brotherhood of Steel

# Fallout Tactics: Brotherhood of Steel

Des McNicholas applies some strategic thought to a post apocalyptic world



❶ Fallout Tactics offers a remarkable tactical environment

The original Fallout (1997) brought a new twist to the tired RPG formula, with more sci-fi than fantasy, real-world settings and simple turn-based tactics. The following year, Fallout 2 built on the theme and improved the interface, firmly grounding the series with a large and loyal group of fans. Fallout Tactics: Brotherhood of Steel is an unashamed action spin-off, but with enough RPG and story elements to satisfy the more cerebral amongst the atomic readership.

With a host of tough single player missions, terrific multiplayer action and stunning post-apocalyptic settings, Australian developer Micro Forté should satisfy the high expectations of veterans and newcomers alike. The first class intro movie sets a suitably desolate tone to proceedings, while the excellent tutorials (complete with walkthroughs) provide a good introduction to key tactics, weapons and equipment. As a result, this is a game that grabs you very quickly, combining atmosphere, a simple interface, and challenging missions.

Despite the action focus, the traditional attachment to RPG characters quickly sets in, with the aim being to keep them all alive long enough to get better at the job. Squad management is particularly well handled, using a simple points system to enhance capabilities like stealth, unarmed combat, and observation, and a good basic mix of skills is available up front to kick things off. Sensibly, using the right specialist at the right time is not as important as a well balanced team, and at least losing any one squad member won't necessarily cost you the mission

atomic  
**8.5/10**

- a major failing with some games.

Controlling the squads in action is straightforward via group and shortcut keys, and players can choose between turn-based or continuous turn-based (essentially RTS) modes of play. Turn-based play is surprisingly difficult to master, although it probably offers the greatest overall challenge for tactical purists, with more emphasis on character skills. Whichever mode you choose, the interface is a standout feature of Fallout Tactics, with ready access to equipment, weapons, briefings and maps. Swapping equipment between characters is simple, and the ability to search bodies often results in that life saving needle, extra clip of ammo, or much needed key.

Fallout Tactics poses a very tough challenge to experienced players and plenty of opportunities for those cunning plans. The terrain is big, complex, varied and visually impressive, with brick walls, barricades, and burnt out cars all suitable for a bit of craven cowering! When combined with the ability to use vehicles and "sneak" characters around the map, clever use of ground and cover can often be a deciding factor, regardless of the odds. And if the enemy AI seems slow to react at times, it makes up lost ground very quickly, providing better opposition than is usually seen in this type of game.

Fallout Tactics ships with Gamespy, and the level of online support is already very high. Interest in the demo has obviously carried over to the final release, and players will have no trouble finding eager opponents. Hosts can choose between assault, skirmish, capture the flag and scavenger missions, squad sizes can be set, and players can pick their favourite mix of characters from the Fallout world. Slowdown certainly sets in once the numbers get too large, but half a dozen squads of four to six pose no problems at all. Aggressive play is the order of the day, and the post mission summary lets everyone know just how well you did (or didn't!).

Fallout Tactics: Brotherhood of Steel successfully balances RTS, RPG and turn-based play elements to produce the best in a very good series. O

## game details



Great atmosphere, simple interface, and challenging (bloody hard!) missions.



Squad members are occasionally slow to react, and the turn-based option can be confusing to use during combat.

**Minimum Requirements:** PII 300, 4MB video card, 64MB RAM, HDD min 750MB

**Recommended:** PIII 500, 16MB video card, 128MB RAM, HDD 1.6GB

**Sound APIs:** DirectSound

**Video APIs:** Direct3D

**Developer:** Micro Forté [www.microforte.com.au](http://www.microforte.com.au)

**Distributor:** Interplay [www.interplay.com.au](http://www.interplay.com.au)



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## Issue 2 Subscription Winners

The incredibly lucky, and hopefully grateful, winner of last month's **1st prize** is M. Wallace of Normanhurst, NSW. He will shortly be receiving an AMD 1GHz Athlon CPU combined with the Asus A7V133 motherboard to run it in. Now that's an upgrade!

**2nd prize** goes out to G. Sloss, from Daisy Hill QLD. 2nd is meant to be worse than 1st, but in this case it's not by much! He gets a brand spanking new AMD Duron 800MHz CPU, alongside the lovely Asus A7PRO motherboard.

**3rd prize** has been won by P. Carthew, of Bulli, NSW. He'll be walking away with the impressive AMD Duron 650MHz CPU as well as the Asus A7PRO motherboard. We think that's pretty damn good for 3rd prize! A special thanks to AMD and CASSA for supplying our subscriber prizes. Cassa: 07 5445 2992  
AMD: [www.amd.com](http://www.amd.com)

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read our full review on page 52

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Atom04

i/o

≥ "I have a temperamental 'puter..."

# We Fix Anything

At atomic we provide a wide range of rescue services at no extra cost to you; think of it as the technical emergency services, as provided by Dan Rutter, Atomic Reader Helper



① This month's lucky letter of the month winner gets the full range of atomic gear. If you didn't win don't worry, you can still get your gear on page 64

① The AMD Duron, the hot CPU of the moment

**i** **Toasty processor?**  
I have a temperamental 'puter which I would like some help with. I suspect that my Duron 700 has been running too hot. I had the odd lock up, and even a reboot once or twice, and I also regularly see the 'blue screen of death' appear, but this may be a separate 3D issue. I have installed a case fan, which is sucking air in right near the CPU, and seems to have stabilised things, at least for now.  
My problem is this: how do I effectively measure the

temperature of components within the case, especially the CPU? I am unsure if my MB has any built in temp monitors or not. It's an AOpen AK33 and has the latest BIOS installed. There is a temp monitor available, but I think it's an optional extra.

I have loaded SiSOFT Sandra but don't know how it gets its temp reading. I have also installed 'Rain' to help things cool down while the CPU is not under heavy use. I would like to be able to play the latest games and such without worrying about a meltdown. What can I do?

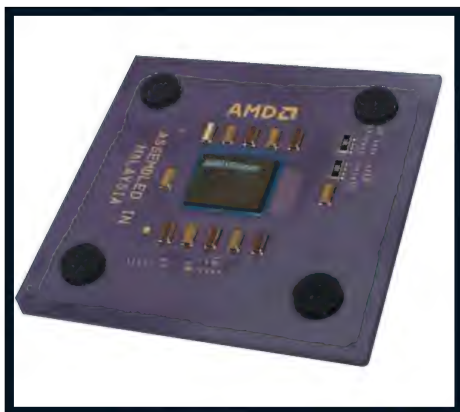
Chris Grasmeder

need a fancy CPU cooler to deal with that much heat, provided you've got reasonable case cooling and airflow.

If you've installed an intake fan near the CPU, you may have created an 'air short circuit' in which cool air is drawn in over the processor and then exits via the power supply exhaust fan, without adequately cooling other components in the computer. This could result in your graphics card overheating when in 3D mode ([english.aopen.com/products/mh/ak33.htm](http://english.aopen.com/products/mh/ak33.htm)) certainly does have the ability to monitor system temperature. It has two thermal sensor headers, labelled JP26 and JP27.

The AK33, like many lower cost motherboards, doesn't actually come with the little thermistor probes you need to use the temperature monitoring features, however. No problem; the probes are standard items, and any half-decent computer store can sell you a couple for not much money.

Current Intel CPUs have a thermal sensor built into the chip itself, which gives you something pretty close to a genuine core temperature reading. AMD CPUs



**O** Adequate cooling's important for current small-die CPUs like Intel's Coppermine Pills and Coppermine 128 Celerons, and also for AMD's Socket A Athlons and Durons. Run any of these chips with no heat sink for more than a couple of seconds and there's a good chance they'll fail. The AMD CPUs are more prone to this sort of sudden death.

At its default speed and voltage, a 700MHz Duron will pump out about 30 watts of heat when it's working hard. You don't



≥ "Two major problems I am having at the moment..."

i/o

## Letter Of The Month: Hackers, hackers, everywhere!

**i** Two major problems I am having at the moment.  
 1. Hacker, hackers and more hackers.  
 I have been getting 20+ hits a day from hackers trying to hack into my computer, mainly with the SubSeven Trojan Horse and the usual UDP and RPC port scans. With all the different types of firewalls and security software available on the market, which one do you recommend? I think this is an important issue as broadband becomes more popular.  
 2. Dual Boot  
 I am trying to set up my computer to dual boot between Windows 98 and Windows 2000. What is the best approach to such a thing? Should I use partition software? If so, which one? Thanks  
 Keith Lau

**O** Ah, there ain't nothin' like running a firewall to get you all hot and bothered about them nasty hackers and their evil intentions towards your precious computer.  
 People with always-on Internet connections regularly get port-scanned by script kiddies hunting easy marks. Generally, there's no reason whatsoever to worry about this, because the scanners are looking for vulnerabilities, not creating them.  
 Take the SubSeven trojan scanners, for instance. They're looking for people who've been suckered into installing the SubSeven server program (by, for instance, running an email attachment called "SexxyMovie.mpeg.exe"...). When the server's running, anybody running the SubSeven client...  
 ...can harvest information from your machine, play with your files as if they were their own, see everything you do, and co-opt the computer for things like Distributed Denial Of Service attacks - or just for more port scanning.  
 But if the server isn't already running, no port-scanning kiddie can magically deliver it to you.  
 Similarly, people scan for twits who've absent-mindedly shared Windows resources with the entire Internet by binding File and Printer Sharing to their Internet network adapter (which could be an appropriate moment to mention <http://www.sharesniffer.com/>). But they can't make you do it. They're just seeing if you already have.  
 And yes, there are various vulnerabilities in Windows and in other operating systems which determined hackers can exploit, especially when you're running programs that rely on Internet connectivity. But, generally, port-scanners are the car-door-triers of the online world.



They just wander around the parking lot seeing if there's an unlocked car, or maybe an open window.

There are many OK Windows personal firewall products, if you want to be safer. None of them are as good as a proper multi-layer heterogenous firewall maintained by someone savvy, but they're better than nothing. Try Tiny Personal Firewall, for instance (<http://www.tinysoftware.com/pwall.php>); it's free for home use.

You can also find more information about what different firewall reports mean at <http://www.robertgraham.com/pubs/firewall-seen.html>.

In answer to your second question - to dual boot Win98 and Windows 2000 - follow this highly technical procedure:

- 1: Install Win98.
- 2: Install Win2000. It'll detect Win98 and automatically add it to its own boot menu.

You can install the two Windows flavours on different partitions if you like, and make things elegant with boot manager software that deals with Win98's inability to start on a system that doesn't have a FAT16 or FAT32 boot partition. But there's not much reason to do this, generally. Just use a FAT32 boot partition, install both OSes, don't let Win2000 turn the boot drive into NTFS, and you're away.

don't have such a sensor, and so you have to make do with an external sensor attached to something which you hope will at least give you an idea of the CPU's internal temperature.

Some motherboards have a sensor sticking up from the board in the middle of the CPU socket, to touch the underside of the chip package; some, like the AK33, just use two-wire thermistor probes which you stick to the heatsink or the CPU itself.

These sorts of sensors don't give you readings you can transfer from computer to computer - because no two probes will have quite the same

thermal contact with the processor - and there's no way to tell how a reading actually relates to the real core temperature. Setting the BIOS or a separate temperature monitor application to sound an alarm or shut the computer down if the temperature gets well above the usual reading is a good idea.

CPU cooling software like Rain sends the CPU HLT instructions when there's nothing for it to do (better operating systems than Windows 95 series do this themselves), which reduces the temperature, but only when the CPU isn't working hard. It's no substitute for proper cooling.

Of course, if your temperature probe's on the heat sink and the heat sink clip fails, the heat sink will be nice and cool while the processor burns to death. And the lousy correlation of probe temperature to CPU temperature means you're still pretty much in the dark about whether your problem's thermal at all. To get an idea if it is, take the side off your computer case and point an ordinary desk fan into the works, going full blast. If your crashing problems go away, then something actually is too hot, and more system fans and/or a heftier cooler for your CPU could be in order.

Send your questions to [io@atomicmpc.com.au](mailto:io@atomicmpc.com.au) or by post to:

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 NSW 2014

i/o

&gt; "You reviewed B17 in issue 1..."

①\* If you want to combine a newer socket 370 based processor with a Slot 1 motherboard then then this handy little slotket is your saviour

## i Cheapo Upgrades

You reviewed B17 in Issue 1, a great game.

However my Pentium II 350, Asus P2B Intel 440BX AGP, 100MHz FSB, 128MB SDRAM, 8MB i740, 12MB Voodoo II system is now struggling to cope. This goes for fully configured Flanker II and even Midtown Madness II.

I'm a pensioner on a fairly limited budget. I had thought of putting in a single 32MB TNT2 M64 AGP card, but I was advised that my CPU was just not fast enough to drive even this modestly - now \$99 retail - priced video card.

Fitting a second hand Slot 1, 600MHz CPU I was told, should do the trick. As these are like hen's teeth, and I may have to



newer and faster graphics cards let you do the same thing only prettier; newer and faster CPUs let you do the same thing only with a higher frame rate.

This is ONLY a rule of thumb, mind you. With more and more load being taken off the CPU by

you may also need to update your BIOS for newer processors, depending on what version you have now. But any computer store should be able to do this for you cheaply if you feel nervous about it.

## "...newer and faster graphics cards let you do the same thing only prettier..."

flash a new BIOS - messy and dangerous, for me anyway - I'm having doubts.

How about upgrading with a 32MB GeForce2 MX card? Any better? These are around \$200 on special now, but I don't know which brand has the best ongoing support for drivers.

Over to you experts.

Robert Gott

3D games are a balancing act between your CPU and your graphics card. How much each component contributes to the final frame rate depends on the game and your graphics settings.

But, generally speaking, if you've got a computer with a modest CPU and an old Voodoo2 card, and you're currently playing a recent game in 800 x 600, 16-bit colour (the best the Voodoo2 can manage) and getting a lousy frame rate, upgrading to a cheap TNT2 Model 64 ('M64') will allow you to play the same game in at least 1,024 x 768, 32-bit colour. And get much the same crummy frame rate, but with much prettier frames.

As a basic rule of thumb,

more capable 3D cards, you actually can now get substantial frame rate benefits from a graphics card upgrade, if you're playing recent games that make use of the fancier features.

At the bargain end of the market, cheap Glorious Elevated Electric Frog unknown-brand NVIDIA-chipset graphics cards are pretty much all a good buy, since they all work with the plain NVIDIA drivers. Never mind what comes with the card; just download the reference drivers from [nvidia.com](http://nvidia.com). And an MX card for twice the price of an M64 is worth the extra money.

But, yes, a faster CPU would also help.

The old P2B

([www.asus.com/products/Motherboard/Pentiumpro/P2b/index.html](http://www.asus.com/products/Motherboard/Pentiumpro/P2b/index.html)) supports any PIII that uses a 100MHz Front Side Bus (anything with a model name that doesn't end in 'B'), and will also work with, I think, all of the Celeron range, including the new ones that use 100MHz FSB instead of the old 66MHz.

To install a Celeron you'll need a Slot 1 adapter card for it (often referred to as a "slotket"), and

## i Antique overclocking

In the last issue you had a huge article about overclocking Intel CPUs - that's why I bought it! But then I found out that it is only about PIII and Celeron CPUs.

My problem now is that my system has a Pentium 200MMX CPU, and my BIOS looks much different because it is much older than your one! I now just want to know if it is the same procedure to overclock my Pentium 200?

Max Teske

Old Socket 7 motherboards set the Front Side Bus and multiplier speeds using jumpers or DIP switches. You can probably pick FSB speeds of 66, 75 or 83MHz, but the higher speeds may not work.

Your CPU isn't multiplier locked (unlike the current Intel chips), so you can fiddle with both settings to overclock.

Don't expect too much, though. The old Pentiums are better overclockers than AMD K6 processors of a similar vintage, but you're still not even slightly likely to get it above 300MHz.

If your motherboard can handle a 100MHz FSB AMD K6-II, you can get a 500MHz one for little more than \$100. If you run that CPU at 75MHz FSB, it'll still give you nearly twice the speed of your Pentium.

Send your questions to [io@atomicmpc.com.au](mailto:io@atomicmpc.com.au) or by post to:

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## SDRAM. 6T/8T

all SDRAM supports such a high speed. Try setting this to 2 if possible, but if you experience system instability, increase the value to 3.

### 'PRESS DEL TO ENTER BIOS at 15M-16M

Just like the above two options for tweaking your SDRAM, this option can be set to either 2 or 3. 2 will give you optimal performance, whilst 3 should increase stability. SDRAM RAS is generally more stable. Remember, many SDRAM modules only support the above settings of 3:3:3, while faster SDRAM SDRAM Cycle time (CUT) is used to toggle the minimum number of clock cycles needed for the Tras and Trc of the SDR, so 5T/7T will give better performance. Again, not all SDRAM will support the faster speed, so revert to the default setting if you begin to have stability problems at the higher speed. SDRAM Page Closing policy (CUS)

The meaning of this field is very obscure. For our purposes, that being getting maximum 3D performance, the optimal setting for this field is single bank page closing.

**system. If you are running OS/2 and have greater than 64MB of SDRAM, set this to OS/2, otherwise leave as Non-OS/2**

high speed. Try setting this to 2 if possible, but if you experience system instability, increase the value to 3. Try setting this to 2 if possible, but if you experience system instability, increase the value to 3.

ormance. Again, not all SDRAM

SDRAM

The meaning of this field is

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SDRAM Page Closing policy

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## CAS

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IEEE 1394

# BIOS late

# atomic BIOS tweaking guide

The time has come face the fear. Bennett Ring gets jiggy with the heart of the PC; the BIOS zone

Tweaking your BIOS options can yield substantial improvements in overall system performance, yet the plethora of vague and cryptic options within usually deter all but the most determined performance hogs. Enter the atomic BIOS Tweaking Guide, which describes the optimal BIOS settings for squeezing the most frames per second out of your system.

BIOS stands for Basic Input Output System, and is the first piece of software that is run when you turn your PC on. This small program is used to initialise all of the hardware components in your PC, and then tells your operating system how to interact with these. Without a working BIOS, you will not be able to boot your PC up at all, which is why so many people are hesitant about flashing their BIOS.

After examining a wide variety of different motherboard BIOS setup menus, we decided to include all of the options that can be found on the ASUS CUSL2 and A7V motherboards. These top of the line boards use the i815 and KT133 chipsets respectively, both the most popular chipsets for AMD and Intel based computers. They also use the popular AWARD BIOS program, which is generally acknowledged as the most widespread type of BIOS in use.

If your PC doesn't use the same BIOS, fear not as the guide should still prove useful to you. While the commands most likely won't have exactly the same names, you should still be able to tell which commands in your BIOS setup screen correspond to the commands in our guide.

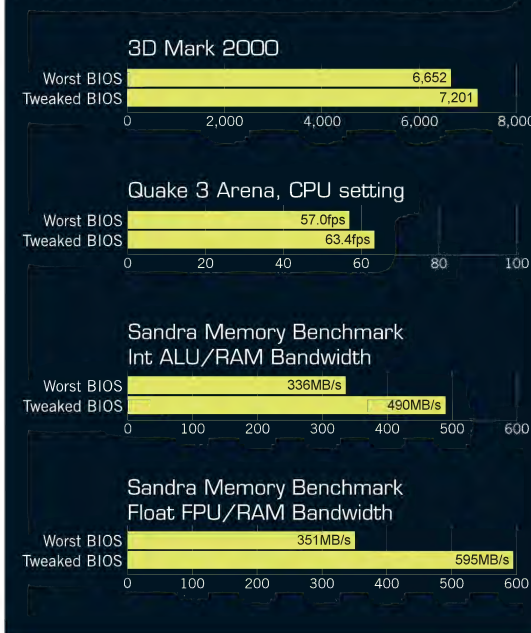
Before beginning any BIOS tweaking, it is prudent to record all of the current BIOS settings of your system. This will aid you if you happen to change a setting that makes your PC, for want of a better word, die. Simply revert to the settings you have previously recorded and you'll be up and running in no time. If you don't wish to do this, you could

always use the BIOS option that sets all values back to their default values, but if your PC was specially configured before you began tweaking, the default settings may not work. In this case it is best to make a note of the settings before you change them.

Change each setting one at a time, rebooting and running a quick benchmark between each change to make sure your PC is still running ok. As you become more proficient at BIOS tweaking, you will be able to change several options at once. ➤

## BIOS TWEAK GUIDE BENCHMARKS

We ran the following benchmarks on our reference 1GHz Athlon system, with and without the BIOS tweaked. The untweaked BIOS had most settings at their lowest, including the memory speed, which was run at 100MHz. As you can see, improvements in performance of 10 per cent and greater can be gained by tweaking your BIOS.

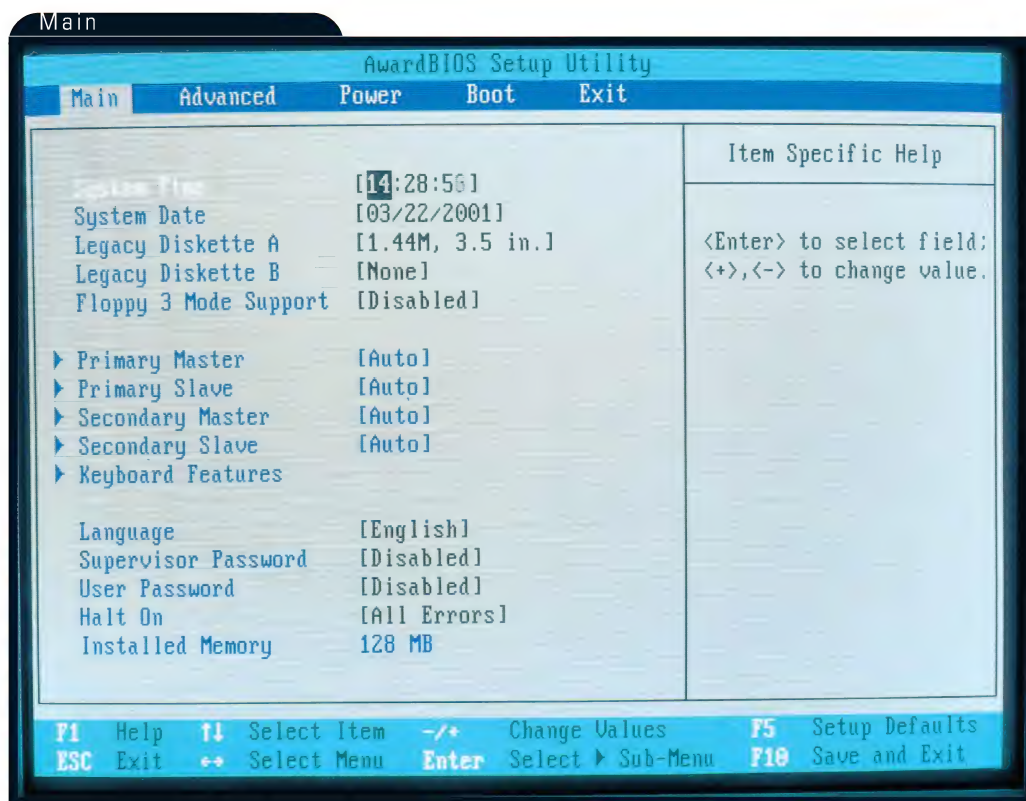


For our purposes, that being getting maximum 3D performance, the optimal setting for this field is single bank page closing. all SDRAM supports and have greater than 64MB of SDRAM, set this to OS/2, otherwise leave as Non-OS/2. Performance system instability increase the val



## feature

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### ⓘ System time

Use this field for setting your system's time. If you find your PC clock isn't keeping good time, you may need to replace your CMOS battery.

### System date

This field is used to set your system's date. Again, if the date keeps changing every time you shutdown your PC, you may need a new CMOS battery for your motherboard.

### Legacy Diskette A

Use this for setting the type of floppy disk drive you have connected to your first floppy controller. Most people would select 1.44MB 3.5in, as these are the most common types of floppy drives in use.

### Legacy Diskette B

Use this for setting the type of floppy disk drive you have connected to your second floppy disk port (if you have a second floppy disk drive installed).

### Floppy 3 Mode Support

This is only to be enabled for floppy disk drives that are 3.5in but have capacities of 720KB, 1.2MB and 1.44MB. These floppy disk drives are not very common in Australia, so unless you have a Mode 3 floppy, leave as disabled.

### Primary Master

This variable regards your Primary Master IDE device. It is best to use the AUTO setting for newer peripherals, as this will automatically detect and configure your IDE device using its optimal settings. If you are using an older device and the AUTO function does not apply the correct settings, you can manually configure the different settings for a wide range of IDE devices. Consult your IDE device manual for the correct manual settings.

### Primary Slave

Exactly the same as the Primary Master field – too easy!

### Secondary Master

You guessed it, see above.

### Secondary Slave

Are you beginning to understand yet?

### Keyboard Features

Used for setting up character input to your system, leave at defaults unless you have different personal preferences.

### Language

This variable determines which language your BIOS will be displayed in. Unfortunately there isn't an option for I337 speak.

### Supervisor password

Used for setting the supervisor password, which will lock off the BIOS options unless this password is supplied.

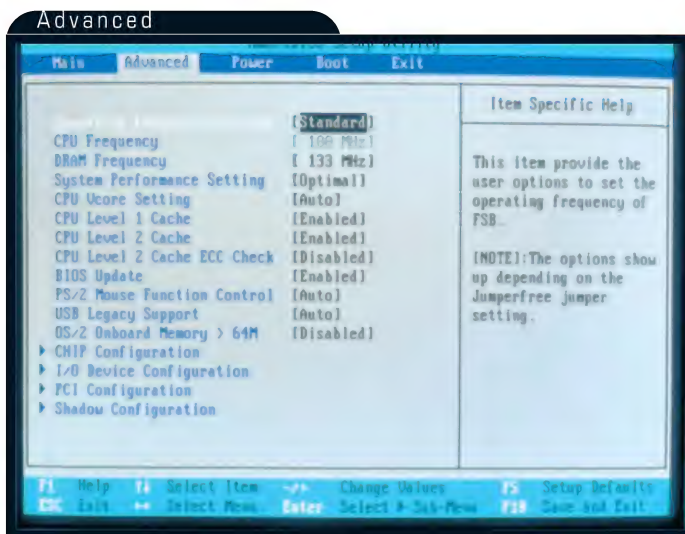
### User password

If this field is set, the user will be prompted to enter a password before being able to use the system. Great for keeping little sisters away from all those 'sensitive' .jpg and .avi files you have.

### Halt on

Tells the system which errors will stop the boot process, set to All Errors. In older motherboards this setting could cause an error for overclockers.





### ⌚ Operating Frequency setting

This determines whether or not you want to use the default FSB speed of your CPU. If set to manual, you will have access to the following field for adjusting the FSB frequency of your system. Leave at default if you don't want to overclock your CPU via the FSB.

#### CPU/FSB Frequency

If you enable the previous option, this field will no longer be greyed out. You can then set this field to the FSB speed that you desire. Useful only to overclockers.

#### DRAM Frequency

Many chipsets support a 100MHz FSB whilst running the memory at 133MHz. Use this variable to increase the speed of your SDRAM to 133MHz if you are running PC133 SDRAM, otherwise leave your SDRAM running at 100MHz. Many people successfully run PC100 SDRAM at 133MHz, so long as the CAS settings are 3:3:3 (see below).

#### CPU Internal Frequency

Another field only of use to the overclockers. If you don't want to overclock, leave this at the default speed of your CPU. If you are going to overclock your CPU, increase its speed via this field. Select the next speed above your default CPU speed.

#### FSB:SDRAM:PCI Frequency Ratio

This field is used for determining the speed of your FSB, SDRAM and PCI slots. There are four possible options that you can choose for this field:

66:100:33 – Users of 66MHz FSB Celerons should choose this option.

100:100:33 – Users with 100MHz FSB Pills or Celerons, combined with PC100 SDRAM, should choose this option.

133:133:33 – Users of 133MHz FSB Pills, combined with PC133 SDRAM, should choose this option.

133:100:33 – Users of 133MHz FSB Pills, combined with PC100 SDRAM, should choose this option. Also useful for users with PC133 SDRAM who are overclocking via the FSB, in case their PC133 SDRAM cannot handle the higher memory speeds resulting from increasing the FSB.

#### FSB/SDRAM/PCI Frequency

This setting is similar to the CPU Internal Frequency setting. It allows you to increase your FSB speed, usually in 1MHz increments. Because your SDRAM and PCI speeds are tied into

the FSB speed, they will also increase as you raise the FSB speed. Useful only for overclockers, otherwise leave this at default.

### System performance setting

Leaving this at normal will automatically select the least aggressive BIOS settings for the majority of your BIOS options, for example it will lower your AGP speed to 2X. When set to optimal, more aggressive settings will be used. If possible set this to optimal, although some systems may not function correctly unless this is set to normal.

### CPU Vcore setting

Leave this at the default setting for your CPU, unless you are overclocking. When overclocking, increasing the CPU Vcore can help you to reach the highest possible speed of your processor.

### CPU Level 1 cache

Always leave this enabled! You will notice a substantial performance decrease if you disable your CPU's L1 cache.

### CPU Level 2 cache

Again, leave this enabled, unless your CPU doesn't have L2 cache. If your CPU does have L2 cache, and nearly every recent processor does, leave this enabled for maximum performance.

### CPU Level 2 cache ECC check

This enables or disables error checking within the L2 cache. Most modern CPUs do not support this option, and if they do performance is likely to suffer, so leave disabled.

### PS/2 Mouse Function Control

Set this to disabled if you are using a serial pointing device instead of a PS/2 mouse. The majority of mice used today are PS/2, and users of these should set this to enabled.

### USB Legacy Support

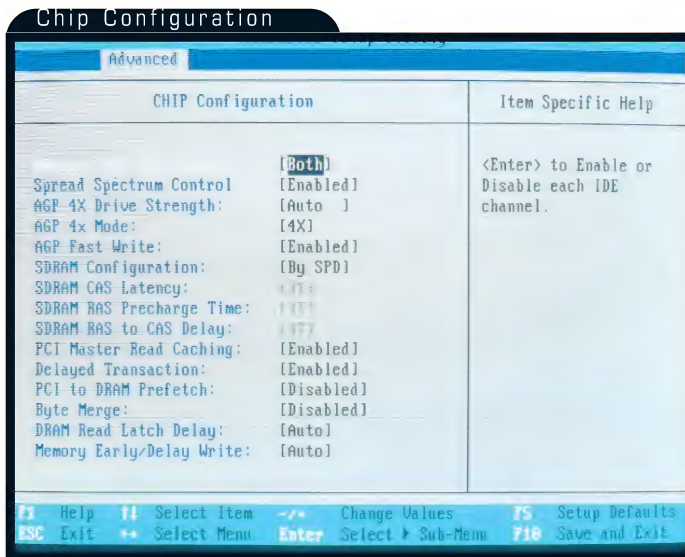
If you are running one or more USB devices, set this to enabled. If you are not running any USB devices, disable this option to free up the USB controller's IRQ.

### OS/2 Onboard memory

This option is specifically for systems that use OS/2 with over 64MB of SDRAM. Leave at disabled if you're not.

## feature

» atomic BIOS tweaking guide



### ① Onboard PCI IDE enable

This setting allows you to set which of the IDE controllers on the motherboard are active. Set this to reflect which IDE controllers you have devices connected to.

### Spread Spectrum Control

This is used to reduce the levels of emission of electromagnetic radiation from your PC. When engaged, it supposedly aids in system stability, although timing-critical devices such as SCSI drives may become unstable when this is activated. Some have reported performance decreases with this option enabled, therefore it is best to leave this option disabled.

### AGP 4X Drive Strength

Leave this at the automatic setting, unless you are having problems with your AGP video card. If so, you might want to try setting this to manual, in which case you will need to find out your video card's AGP drive strength parameters.

### AGP 4X Mode

Enabling this will set your AGP port to run at 4X speed. Whilst a higher AGP speed will give you better performance, many video cards will not function correctly at 4X, so for older video cards disabling this might be necessary.

### AGP Fast Write

A fastwrite transaction sends the data directly from the core logic of the video card to the AGP master, instead of making the AGP master read a copy of the data from the system main memory. This equates to slightly higher performance. However, you will need a video card that is capable of AGP Fast Writes otherwise you will have major instability problems.

### SDRAM configuration

If you select the automatic (BySpd) setting, the default speed settings for your RAM will be enabled. However, if you select manual configuration, the following options will no longer be greyed out and you will be able to tweak your memory timing.

### SDRAM CAS Latency

Without going into an in depth discussion of how your SDRAM memory operates, all you need to know is that this can be set to 2 or 3. 2 is the optimal setting for performance, but not all SDRAM supports such a high speed. Try setting this to 2 if possible, but if you experience system instability, increase the value to 3.

### SDRAM RAS Precharge time

Again, all you need to know is that this can be set to either 2 or 3. 2 will give you optimal performance, whilst 3 should increase system stability.

### SDRAM RAS to CAS delay

Just like the above two options for tweaking your SDRAM, this option can be set to either 2 or 3. And just like the previous fields, 2 is fastest whilst 3 is generally more stable. Remember, many SDRAM modules only support the above settings of 3:3:3, while faster SDRAM supports the settings of 2:2:2.

### SDRAM Cycle time

This is used to toggle the minimum number of clock cycles needed for the Tras and Trc of the SDRAM. 6T/6T is the default option and is the most stable, but changing this to 5T/7T will give better performance. Again, not all SDRAM will support the faster speed, so revert to the default setting if you begin to have stability problems at the higher speed.

### SDRAM Page Closing policy

The meaning of this field is very obscure. For our purposes, that being getting maximum 3D performance, the optimal setting for this field is single bank page closing.

### Command per cycle

If you have an onboard VGA chip, set this to enabled for a slight performance increase. Otherwise leave this at disabled.

### Memory hole at 15M-16M

Certain ISA devices require that this be enabled, otherwise leave at the default disabled setting.

### PCI 2.1 Support

Enable this when possible to achieve faster performance. When enabled, features such as passive release and delayed transactions, which can be found as separate values in certain BIOS's, are enabled. If you notice system instability with this enabled, revert to the disabled setting.

### High Priority PCI mode

If you are using an IEEE 1394 PCI card, select this to boost performance to the first PCI slot. Otherwise you may leave this setting as disabled.

### SDRAM data driving mode

This can be set to either normal or strong. Setting it to strong may help increase stability as well as allowing you to run your memory at faster settings, without affecting performance.

### PCI Master Read Caching

This variable sets whether or not the CPU caches PCI master reads. AMD recommends setting this to enabled for Athlons and disabled for Durons, due to the Duron having half of the L2 cache of the Athlon. Leave enabled for PIII CPUs.

### Delayed transaction

This setting is only relevant when there are ISA devices within the system. If so, enable this, otherwise leave disabled. »

# www.atomicmpc.com.au

## You are not alone

Atomic is a mag, it's a Web site and it's a community. The mag and the site were hand-crafted by skilful artisans. The community, well, that took care of itself. Readers not much different to you found their way to our site like Lemmings to a seaside cliff. Once there, they discovered wonderfully clever news stories as well as our forums.

Witness the value of the site: Once upon a time Person A had a terrible problem with their PC, the answer, unusually, wasn't in atomic magazine, so Person A put up a post on the Tech Talk forum. Within minutes Person B had posted help! Over the following hour Person's C-Z posted contradictory answers, but the point is; there's help out there for you.

Help and community. Come and make friends with other atomic readers, it's a most elite community and you're ever so welcome.

Do please visit, if you haven't already, dear reader. Visit our forums, read what like-minded people are saying to and at each other. Sometimes it's kind, other times hilarious, often it's right down there in the intellectual basement. At all times, though, it's going on.





## feature

» atomic BIOS tweaking guide

**PCI to DRAM prefetch**

Enabling this will help increase performance, especially when a sound card or IEEE 1394 PCI card is installed in the system.

**Byte merge**

Enabling byte merges will merge individual write commands into single 32-bit blocks of data, and then transfer them to an individual command. Enable this for higher performance, although some systems may become unstable with this option enabled, in which case set to disabled.

**DRAM Read latch delay**

Leaving this at auto resulted in the same performance as all other settings, but with greatest stability. Therefore leave at auto.

**Memory early/delay write**

Theoretically, the lower the setting, the faster your SDRAM should perform. However, we noticed no performance increase when lowering this, so leave this at auto.

**Memory data drive**

Set this to strong to increase stability, especially when you have overclocked the FSB or are running your memory at high speed settings.

**CAS# Drive**

Again, set this to strong for optimum stability with SDRAM that is being run at its highest speed settings, or if you have overclocked via the FSB and thus overclocked your memory speed.

**DIMM Interleave setting**

Enable or set this to auto to enable interleaving of your memory. This is a much more efficient way of utilising your memory and will result in increased performance. If you notice system instability after enabling, set this to disable.

**I/O Recovery setting**

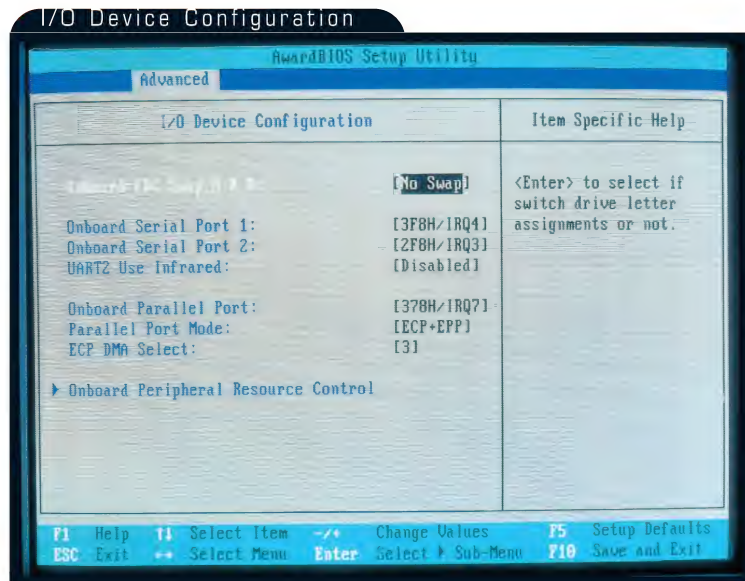
Increase this setting if you are using ISA devices that don't seem to be functioning correctly.

**Graphics Aperture size**

This will reserve the selected amount of memory for direct memory access of the advanced graphics port. Set this to approximately half of your total SDRAM amount for optimal performance.

**Video Memory Cache Mode (USWC)**

To enable this feature, you must have a USWC compliant video card. If you do have a USWC compatible video card, enable this for a slight performance increase. Leave disabled if you have a non-USWC card, otherwise you will most likely have major problems with system's stability.

**ⓘ Onboard Floppy Disk A-B Swap**

Use this option if you have two floppy disk drives and you wish them to be swapped, without actually having to swap the floppy cables on the motherboard.

**Onboard Serial Port 1**

This option allows you to change the assigned address and IRQ of your serial port. Leave at default unless you have a conflicting IRQ.

**Onboard Parallel port**

Use this field to set the address of the onboard parallel port connector. If you have your parallel port enabled, you will then be able to select the operation mode of the port, either ECP or EPP. Select the mode that is compatible with the device attached to the parallel port.

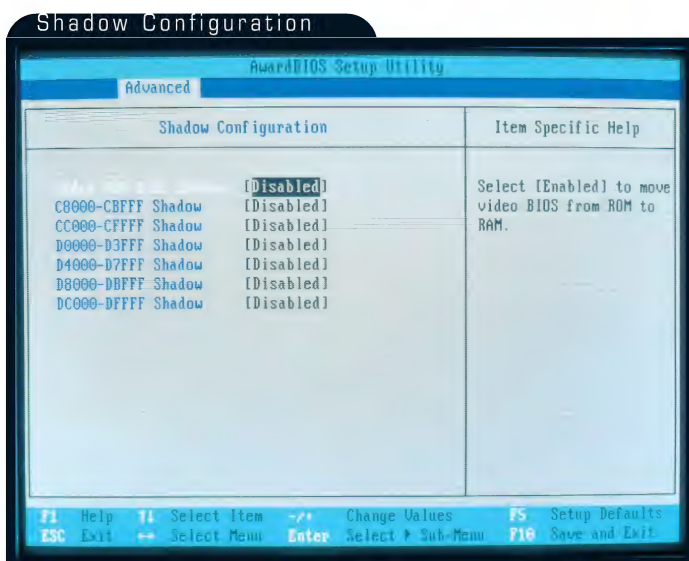
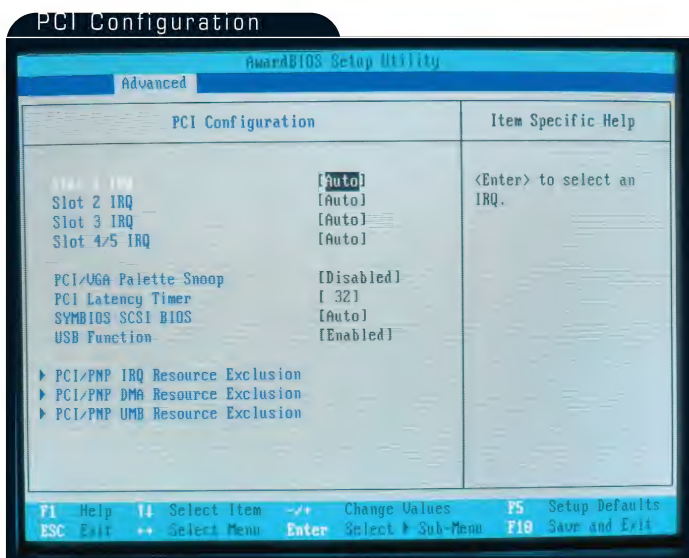
**Onboard Peripheral Resource control**

This will lead to another screen that allows you to set up your integrated peripherals, such as integrated sound cards or onboard modems. As this will be different for every board, it is best to consult your motherboard manual for details regarding this section. If you aren't going to be using the integrated devices (and which power user would be?), disable them.

**'...your PC won't even boot anymore, don't panic! All you need to do is clear the CMOS...'**

**Clear out of here, Mr CMOS**

If you manage to screw things up to the point where your PC won't even boot anymore, don't panic! All you need to do is clear the CMOS, the onboard memory tasked with storing your BIOS setup options. First you need to power down your system, before unplugging the motherboard from your power supply unit. Most motherboards will have two pins that need to be connected for several seconds with a jumper, after which the CMOS is cleared and the BIOS options are back to their default options. Another common method of clearing the CMOS is to connect two points on the motherboard (a flat head screwdriver does the job well) for several seconds – these are often labelled as CLRTC. Just remember to make sure the motherboard power cable is detached from the motherboard. There are also less popular motherboard specific ways to clear your CMOS, such as having to remove the CMOS battery completely, and you will need to consult your motherboard for these. For newer motherboards, there will always be either two contact points or a jumper.



#### ④ Video ROM BIOS Shadow

For optimum performance, leave this setting disabled. Older video cards benefited from this being enabled, and many people still cling to this belief. However, recent video cards will benefit nothing from having this setting enabled, and may actually perform slower if they aren't compatible with this mode. In fact, with this enabled your system may crash if any other programs try to access the area of memory reserved for the video BIOS.

**C8000-CBFFF Shadow**

**CC000-CFFFF Shadow**

**D0000-D3FFF Shadow**

**D4000-D7FFF Shadow**

**D8000-DBFFF Shadow**

**DC000-DFFFF Shadow**

These shadows are only for use with expansion cards that have their own ROMs. Disable unless you have such a card.

#### ④ Slot 1 IRQ

If the device plugged into PCI slot 1 requires an IRQ to be reserved for it to function properly, set this field to reflect that IRQ. With newer components this should not be necessary, so it is best to leave at Auto.

#### Slot 2 IRQ

Same as above but for PCI slot 2.

#### Slot 3 IRQ

Same as above but for PCI slot 3.

#### Slot 4/5 IRQ

Same as above but for PCI slot 4 and 5.

#### PCI/VGA Palette snoop

Disable this for optimum performance. If you own an older video card and notice artefacts or visual glitches with this disabled, set to enabled.

#### PCI latency timer

Leave on the default setting for the best performance.

#### SYMBIOS SCSI BIOS

Leave this at auto unless you are using a SCSI device that has its own SYMBIOS BIOS.

#### USB function

If you wish to use USB devices, set to enabled. If you won't be using any USB devices at all, set this to disabled to free up system resources.

#### PCI PnP IRQ reservations

If you enter this field, you will be able to reserve any IRQ for a device that needs an IRQ manually reserved. (SoundBlaster Live! SB16 legacy support anyone?) This is similar to the Slot 1 IRQ field, except it doesn't tie the IRQ to a specific PCI slot.

#### PCI PnP DMA reservations

This section is the same as the IRQ reservations, except you will be able to reserve DMAs for devices that need them.

### The Best of the BIOS

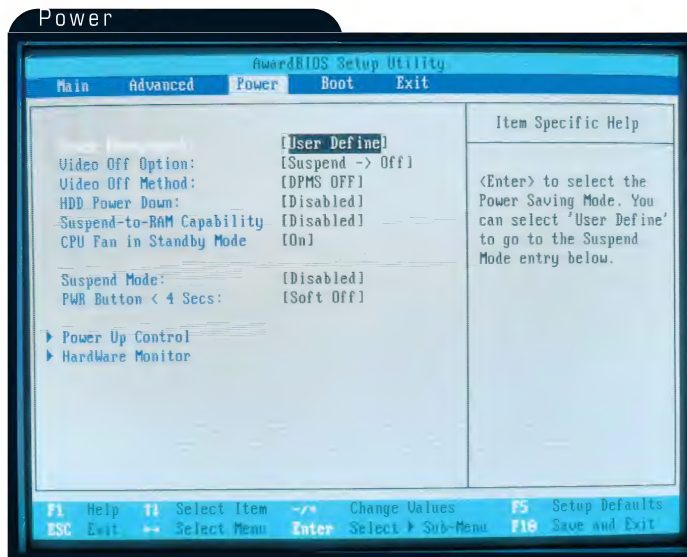
The following BIOS settings have the greatest impact upon system performance, so you'll probably want to adjust these first:

- DRAM Frequency
- System performance setting
- AGP 4X mode
- AGP Fastwrites
- SDRAM CAS latency
- SDRAM RAS precharge time
- SDRAM RAS to CAS delay



## feature

» atomic BIOS tweaking guide



## ① Power management

Select which of the different power saving methods is most desirable. At atomic, we never power our machines down as we're too busy using them, so we disable this option. Having it disabled can also stop crashes caused by auto-power downs on systems that don't like to be put in sleep mode.

**Video Off option**

This field determines whether or not you have power saving activated for your monitor. Set to always on if you don't wish to enable power saving for your monitor, otherwise set to Suspend -> Off.

**Video Off method**

If you set the previous field to Suspend -> Off, this field will have several options as to what type of power saving you wish to use for your monitor. Your monitor must support DPMS (Display Power Management System) power saving features if you wish to use any of the supported DPMS modes. If you have enabled a screen saver within Windows, it will not work when you have activated Video off via the BIOS.

**HDD Power down**

If you want your hard drive to power down when not in use, use this field. Set the number of minutes of zero activity before the hard drive will power down. This will not actually shut down your entire system, instead only power down the hard drive, which can help to keep hard drive temperatures down. Note that this setting is only applicable to IDE hard drives, SCSI drives will not be affected by this setting.

**Suspend to RAM capability**

This energy saving feature shuts down nearly all of the components within the PC except for the SDRAM, and is in effect a 'sleep' mode for your computer. Many motherboards do not properly support this feature, so unless you absolutely must use this capability, disable this variable.

**CPU fan in standby mode**

This determines whether or not your CPU fan is still active when the PC is in standby mode. We recommend leaving this enabled (you can never be too safe!).

**Suspend mode**

Use this field to set the amount of time that the system is inactive before it goes into suspend mode. Again, we prefer to leave this option disabled.

**PWR button <4 secs**

This field has two settings, soft off and suspend. In soft off mode, your power switch will work as a normal power off button when pressed for less than four seconds. When in suspend mode, pressing the power button for less than four seconds will put the computer in suspend mode. Set this according to your own personal preference.

**AC PWR loss restart**

When set to disabled, your system will stay off if the power supply is interrupted. If set to Previous state, your computer will return to, you guessed it, the state it was in when the power was removed.

**PWR up on external modem**

If enabled, your computer will power up from Soft off mode when it receives a call or the modem is restarted. The computer will not be able to receive or transmit data until it is fully powered up again. Your modem must be compatible with this mode for it to work.

**Wake on LAN or PCI modem**

Identical to the above setting, except it will only wake upon a wake up signal from another computer on a local area network. Your network card must be compatible with this function for it to work.

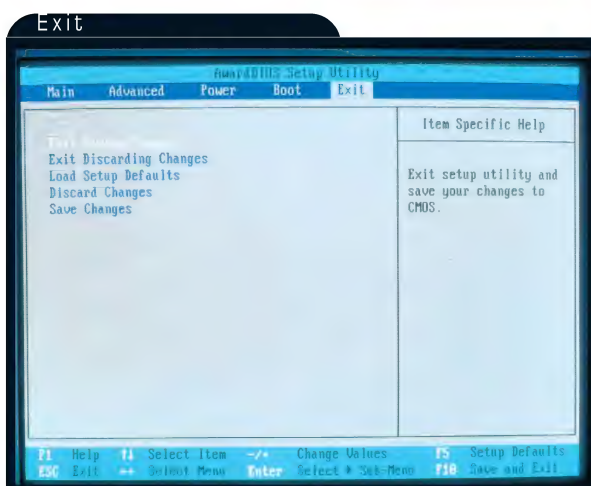
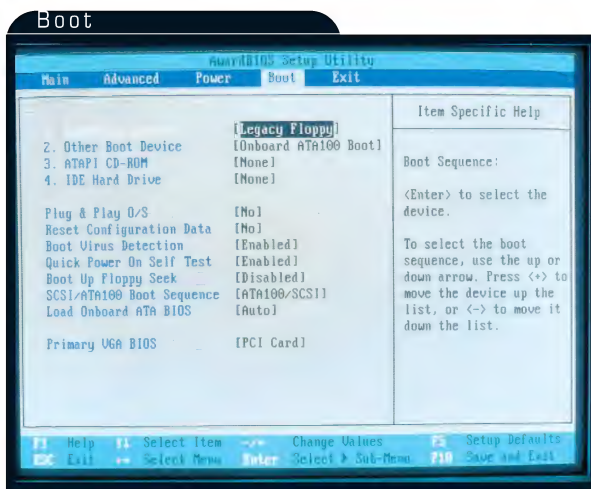
**Auto power up**

Use this variable to configure a time that the computer will boot up at each day. This setting is great for turning your \$4,000 PC into a \$4,000 alarm clock.

## Flashing is fun

Flashing your BIOS does not refer to taking your PC case sides off and parading the naked motherboard to children attending your local primary school. No, BIOS flashing is much less exciting than that. It actually refers to the process of updating the version of BIOS that your motherboard is using. BIOS upgrades promise to increase system performance as well as stability. The most common method of updating your BIOS is to use a BIOS flashing program in conjunction with the latest version of the BIOS. You will need to download the most recent version of your BIOS, as well as the latest version of the BIOS installation software specific to your motherboard (Award BIOSs use a small program called Aflash). It is crucial that you download the correct BIOS version, so check your motherboard manual for the exact reference name that the manufacturer uses for your motherboard. Boot your PC into MS-DOS mode, and then start the BIOS installation utility. It will prompt you to backup your old BIOS or flash to the newer version. It is wise to always back up your old version so you can revert back to it if you have any problems with the new version. Then use the update utility, entering the exact file name, to flash the new BIOS. It is imperative that you don't turn off the computer during this process, as you could corrupt the new BIOS. If this happens you will have one dead motherboard, which will most likely need to be returned to the manufacturer. Then reboot your PC, and enter the BIOS setup menu. Select the 'Reset to defaults' option from the Save menu before rebooting again. If you follow the above steps, you shouldn't encounter a single problem.





### ① Exit saving changes

Use this to save any changes you have made to the BIOS, before exiting the BIOS setup screens.

### Exit discarding changes

So you've entered a heap of new BIOS settings, and you're too chicken to try them out. Use this setting to exit the BIOS without saving any of the changes you have made.

### Load setup defaults

Use this option to load the default options for all of the fields within the BIOS setup menus. Handy for resetting all your BIOS fields in case you screwed up somewhere and can't remember where.

### Load optimum defaults

Use this to load the optimum settings for the BIOS setup menus. Obviously, we recommend trying this option before beginning your BIOS tweaking.

### Discard changes

Use this option to discard any changes you have made to the BIOS settings, without exiting the BIOS setup screens.

### Save changes

This option will save any changes you have made to the BIOS, without exiting the BIOS setup screens.

### ① Removable device

Select any removable devices that you have installed if you wish the computer to search for the OS here first. For a quicker boot, leave this as disabled. Use the + and - key to move each of the four boot devices around in the order that the BIOS will search for the OS. The number 1 device will be searched first, then the number 2, followed by 3 and finally 4.

### IDE HD

Usually your OS will be on one of your IDE devices. Select the appropriate IDE device that contains your OS from the list presented. Use the + or - key to make this the number 1 boot device for faster boot times.

### ATAPI CD-ROM

If you wish the computer to boot from a CD within your CD-ROM drive, for example when installing WinME onto a clean system from the CD drive, set this as your first bootable device. Otherwise leave this disabled for a quicker boot.

### Other boot device

If you have a SCSI device or a LAN that you wish to boot from, select it in this field. Otherwise leave as disabled for the quickest boot time.

### PnP OS

This field causes more debate than any other. Microsoft recommends leaving this as enabled for Win98 and above, but we beg to differ. When enabled, the OS handles all of the IRQ assignments for your devices, and we have found this to cause major problems with some devices. We recommend setting this to disabled, as we have had much fewer configurations problems with it set to this.

### Reset config data

Only enable this when you have installed new devices into your computer; otherwise leave as disabled.

### Boot virus detection

Leave this enabled to stop viruses gaining access to your boot sector. However, some operating systems need to write to this area when installing, so disable this option when installing a new OS.

### Quick power on self test

Enabling this will skip some of the POST tests that are run upon booting the PC up, making the boot faster. However, configuration problems might not be detected with this mode enabled, so disable this whenever installing new hardware.

### Boot up floppy seek

Disable this for the fastest boot time, as this function is now redundant for the majority of new floppy disk drives.

### SCSI/Ultra 100 Boot sequence

This field determines whether your system will search the SCSI drive or Ultra 100 drive first for the OS. Of course, you must have one of these devices installed for this setting to have any relevance.

### Load onboard ATA BIOS

If you are using a Promise ATA/100 controller and hard drive, set this to enabled. Otherwise leave as disabled for a huge decrease in boot times.

### Primary VGA BIOS

This setting is useful only to those that have two separate graphics adaptors within their system. If so, select PCI to make your PCI graphics card the primary adaptor, or else select AGP to make your AGP card the primary display device. □

# Bright lights, big windows

It's Tool Time again with Bennett Ring and Luke St Clair;  
this month's madness: Phase 1 of PC beautification

There is a revolution occurring in the world of PC aesthetics. In the past, the humble PC case had been seen merely as a shroud to hide the tangled mess of cabling and cluttered peripherals within from view. Yet as people spend ever increasing amounts of cash on the components within their boxes, the desire to proudly display these for all the world to see has risen amongst PC builders.

The most attractive way of letting people see the goodness contained in your box is to install a Perspex window, with a dash of neon thrown in to illuminate. Yes that's right, a Perspex window in your PC, using Neon lighting to brighten things up a bit. While this does sound a tad crazy to a non-case modder, it really isn't that difficult to do, and the end result is a PC that will become a feature of any room.

Following on from last month's case fan installation guide, we will again be using the trusty Nibblers. While it will take you a little longer to cut such a large hole, they are still the cheapest, safest and easiest method for people who don't happen to cut steel regularly.

## Equipment needed

Jig saw with fast cut metal/plastic blade (for Perspex cutting, not necessary if using pre-made window kit)  
Electric drill  
Hole saw  
3/4in steel drill bit  
Nibbler cutting tool  
Silicon Rubber based glue  
Velcro  
Cable ties  
Pencil  
Ruler  
Compass  
Plexi tube  
Rubber edging  
Neon PC light kit

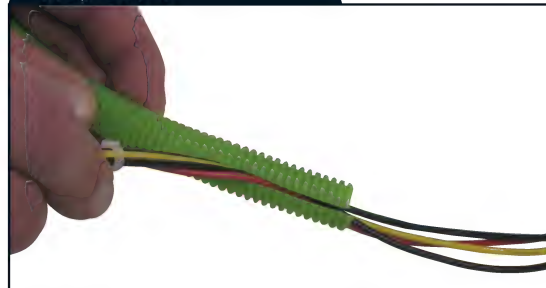
Difficulty: Toolskilz



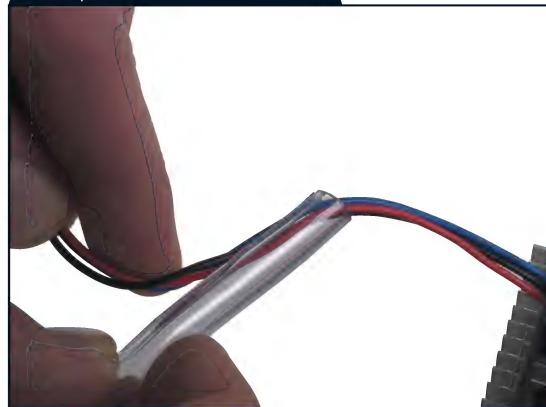
### WARRANTIES

If you are planning on making changes to an off-the-shelf system, check to make sure it won't void the warranty.

step one a

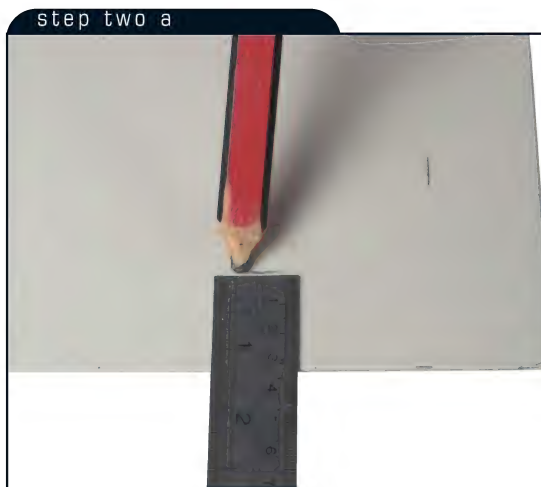


step one b



### ① Step 1 - Cleaning up the wires

If you're going to be giving the whole world a nice view of the interior of your case, it would be a nice idea to clean everything up. After grouping together the wires that were close to each other, we enclosed each bundled section in either clear or green plexi tube, found at a car spare parts shop. Choose a colour that will complement your neon lighting kit's colour. Simply measure the desired length of the tube, before cutting the pipe to that length. Then make a long continuous cut down one side of the piping so that you can insert the wires. Insert the wires into the pipe, doing this for as many wires as possible in your case. Then use cable ties to tie down the pipes throughout the case. Now could also be an opportune time to clean all your peripherals using a can of compressed air.



### ① Step 2 – Measure twice, cut once

Now is the time to measure up and mark the side of the case that is to have the window hole cut in it. Obviously this is easier for cases that have separate removable sides as opposed to one removable case cover. You must check that your case side will still be removable when it has the Perspex mounted, as the Perspex will intrude into your case by around half a centimetre. We decided to make our hole as big as possible, in a simple rectangular shape. If you want a more intricate design, remember that the Nibblers can't do extremely fine detail, so you might be better off using a jigsaw or getting a steel worker to cut the case. We used our bass tube (see what we use this for later in the piece) to trace rounded corners onto our cutting guide line.



### ① Step 3 – Nibbling the hole

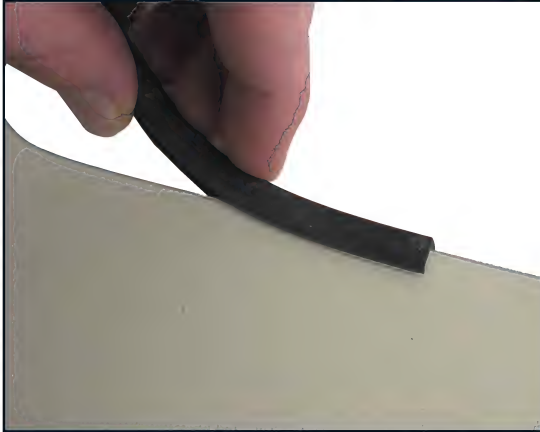
You will need to cut an insertion point for the Nibbler head in your case side, the simplest method being to drill several joined holes with an electric drill. Make sure your drill has a steel cutting bit for these holes, and is set to the highest speed possible. Insert the Nibbler head into the insertion hole so that you can look down onto the top of the Nibbler's cutting edge, while at the same time being able to see your guideline. This will enable you to line up the Nibbler precisely with the guideline for each and every cut. We've found an oven mitt, or any similar padded glove, is great for easing the pain of an extended Nibbling session. Don't try to rush the cut, take your time and keep it straight. ➤



## tutorial

» Bright lights, big windows

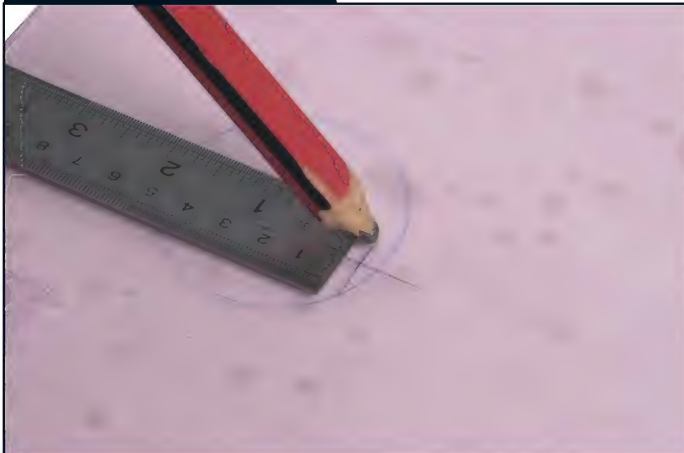
step four



## ① Step 4 – Hole edging

After a couple of hours of cutting, you should have a whopping huge hole in the side of your case. Use a file or sand paper to sand back the edges for a nice smooth finish, although this is not essential as we will be using rubber edging. Measure the approximate length of edging you will need before cutting the rubber slightly longer than this. Make sure your edging isn't so thick that it will cause the Perspex to sit so high above the case cover that the Velcro tabs you will be using won't meet. Using a silicon rubber based glue, glue one end of the rubber onto a straight section of the hole. Then slide the edging onto the edges around the hole, gluing it in place as you go. Make sure you don't use so much glue that it is visible past the edging. When you have lined the entire hole and have reached the beginning point, cut the edging so that it matches up precisely with the starting point. Then glue in place before cleaning the rubber of it's protective white powder. Using the silicon rubber based glue will make the removal of any excess glue easy to accomplish.

step five a



## ① Step 5 – Measuring and cutting the Perspex

Now that your hole has been lined to ensure you don't lose any fingers when handling your case, the time has come to measure and mark-up the Perspex window. If you are buying a pre-made PC Perspex window, you can skip this step altogether.

Otherwise, make your Perspex window slightly bigger than the hole in the case cover by around 1.5cm on each side. As we will be using Velcro to affix the window, make sure there is enough space on each corner of the Perspex so that the Velcro won't be visible from the outside of the case when the window is mounted. Leave the protective plastic film on the Perspex in place, to stop any scratches occurring during the manufacturing process. Using a jigsaw equipped with a fast cut steel/plastic blade, we then proceeded to cut the Perspex.

When cutting the Perspex, ensure that it is firmly secured, with no large areas unsupported. If you don't do this, you may get cracks occurring in the Perspex as it flexes while you cut.

step five b



## If it's not on, it's not on!

Before doing any cutting, make sure you are wearing the correct safety clothing. A long sleeved shirt, jeans, gloves and safety goggles should keep you well protected. This is most crucial when cutting the Perspex, as this melts when being cut. As a result, tiny beads of molten perspex will fly off the cutting blade, and these can be very hot on naked skin. And you don't even want to think about what they could do to your eyes. If you cover up before cutting, it will all be a pain free affair.



### ① Step 6 - The wonders of Velcro

We decided to use Velcro to attach the Perspex to the case window hole. Many people use glue, but we've found that this can be a messy procedure. By using Velcro, we could move the perspex by a small amount in any direction, helping us to line up our bass tube suckhole perfectly with the CPU. It is also much easier to remove the window if you want to replace it in future. Buy a small strip of Velcro that uses double sided tape for mounting. Cut this into four small tabs, one for each corner of the Perspex window. Place one tab on each corner of the Perspex, peeling back the protective plastic film on each corner so that you can mount the Velcro tab directly onto the Perspex. Then line up the Perspex on the interior side of your case, and attach the other half of the Velcro tabs to the case, making sure they line up with the tabs on each corner of the Perspex window. If you find you've placed one incorrectly, simply peel it off and re-stick it in its correct position.

### ① Step 7 - Suckhole time

To aid in cooling, we decided to add a suckhole in the Perspex, directly over the CPU. We then inserted a bass tube, available from most electronic stores, into the suckhole. By doing this, we ensure a supply of cool air to the CPU, using the Heatsink fan to draw the air down into the pipe.

Attach the Perspex to the side of the case using the Velcro tabs, before reattaching your case cover to your PC. Once you have it all remounted, stop telling yourself how darn good it all looks and use a pen to mark on the Perspex the exact centre of your Heatsink fan combination. Remove the case cover again, before removing the Perspex window from the case cover. Use a compass to draw a guide hole slightly bigger (by around a millimetre each side) for the bass tube. Using either a hole saw drill bit or a jigsaw, cut out the suckhole in the Perspex. Finish the hole by sanding it back to a smooth finish.



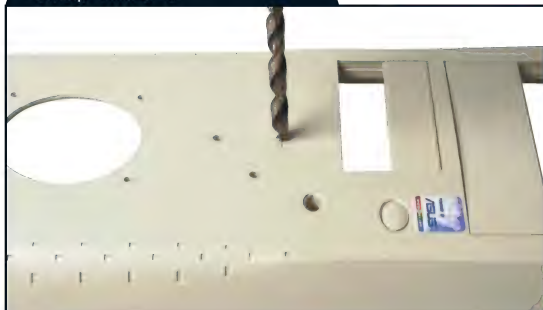
### ① Step 8 - Bond the bass

Cut your bass tube so that it sits a couple of millimetres above the CPU heatsink fan, and then glue it into place in the Perspex using the same Silicon Rubber based glue that you used to glue the edging into place. You can also screw the bass tube into place, but this can cause cracks within the Perspex. Apply just enough glue so that you can't see any of it spilling out from under the bass tube lip. Leave the glue for several hours to dry, making sure that the bass tube lines up directly over the CPU. We did this by applying the glue, before reattaching the case cover with the Perspex window in place. We then laid the PC down on its side, with the Perspex window face up. While the glue was still wet, we manoeuvred the tube so that it lined up exactly with the CPU before leaving it to dry for several hours. After it had thoroughly dried, we removed any excess glue that had spilled out from under the lip of the bass tube. Make sure the glue has totally dried before you clean it. ➤

## tutorial

≧ Bright lights, big windows

step nine a



## ① Step 9 - Vegas baby, Vegas!

Now you have completed all the hard work, it's time for the very simple procedure of installing the Neon light. Our Neon light was a 10in model, and we determined that the optimum positioning for it would be along the bottom of the case. The Neon kit supplied to us used double sided tape for attachment, so it was a simple matter of peeling off the tape cover and sticking the neon tube down. We then attached the power leads from the unit to the PSU, but of course we had to cover these in tubing first. The Neon kit had a rocker switch for activation that needed to be mounted as well, so we decided to put it on the front plastic face of the case. Using a drill bit wide enough to create a hole for the switch to fit in, we drilled a hole in the plastic face before inserting the switch.

step nine b



step nine c



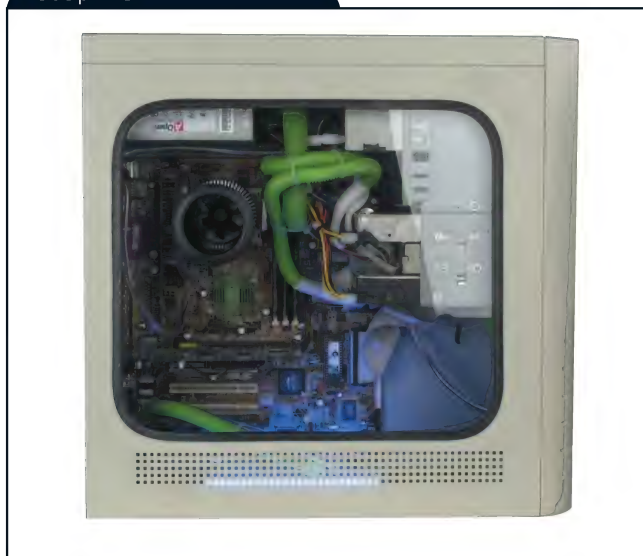
## ① Step 10

Now that you have it all installed correctly, it's time to finally remove the plastic film from the Perspex. Then mount the Perspex to the case cover using the Velcro tabs, before reattaching your case cover to your PC. Power up the system, flick that Neon switch and be prepared for bucketloads of awe from any passers by.

We left the power switch continually on, so that the Neon light is activated every time the PC is powered on. The shot to the right was taken in a room with bright lighting, and thus doesn't show off the Neon as well as if the box was in a semi-darkened room. The light thrown off by the Neon was enough to illuminate the keyboard during late night gaming sessions.

The Neon light used was supplied by James at PC Case Gear, [www.pccasegear.com](http://www.pccasegear.com), and manufactured by PC Mods

step 10







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post apocalypse

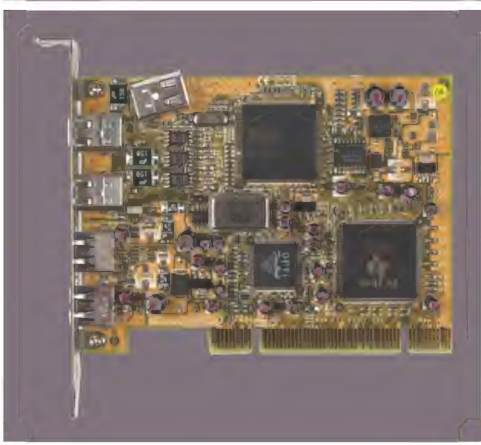
» 'I hate Americans. I hate Americans with a passion'

# post apocalypse

Say your piece, spill your guts, vent your spleen, rant and rave. We'll print anything offensive and/or intelligent.

## Forum Post of the Month: A humble, non-conflictive note

This month's Forum Post winner gets the Firewire/USB Combo Card from Belkin (thanks Pam!). Check out the review on page 54, it's a cool bit of kit. Well done KremLiN!



I hate Americans. I hate Americans with a passion. They are ignorant, self-oriented, mis-informed and presumptuous. Despite my prejudice however, I highly admire one aspect of their mentality, and hope that one day there will be a

similar movement in Australia. The Traineeship.

Young people need experience. To move into a steady, well-paid job as a technician, programmer, administrator, manager, marketer or whatever, candidates are seen as requiring "At least four years of experience". Every day, I read the papers, I browse the 'net, looking for a break. I hate to admit this, because I love Australia so much - there are no breaks. I am now in my third year of a Computing degree in Melbourne. I work at a computer shop at a major shopping centre, and I'm saving to do my CCNA. For what? No one is prepared to give a young person a go these days - especially in our industry, it would seem. The managers at the top have no idea what is required, or that there's a distinct gap in the industry. I consider myself very lucky, and don't stop appreciating my position for a second. With my experience, finding a job that leads to a high position will be a lot easier, than if I had not worked in the industry in any way. But what about the people who aren't so lucky? From what I've seen, that seems to be over 90% of the youth in this country pursuing an IT career. What will they do? Corporations do not offer traineeships or internships to young people for one reason or another - but it all boils down to one word: experience. But how do we get the experience if they don't stick their neck out give it to us themselves? The Americans have it right. A prediction: What does this mean for us? When those who do have experience begin to retire, and as the gap between those with, and those without experience increases, the industry will find itself at a point where young blood must be trained and employed. Then we'll remind them of their unwise ways, of the fact that they didn't give us a break when we beckoned for it most, and then as a result, three words will echo throughout the IT industry: "Name your price". KremLiN, Forums

Send your letters to [post@atomicmpc.com.au](mailto:post@atomicmpc.com.au) or by post to:

### Letters

atomic  
PO BOX 275  
Beaconsfield  
NSW 2014

### Playing Hard

I am writing to find out why there is so much content on Games when you started the promotion of your Mag, you said there would be computer tech info that would be great, I subscribe to PC Authority and get games info there, there is so much info going begging to inform subscribers on technical aspects of computing, surely you don't have to put games reviews in, give us a break guys, hope to see less about games.

Regards Ray, email

*We are not a games mag, although, for many of our readers atomic could be considered 'games-driven*

*hardware'. The proportion of games coverage to pure hardware is small and the games we choose to cover are the best and most significant.*

*We believe that readers who don't play games may be interested in the state of the art in gaming, as games push PCs harder than any other application, and games developers adopt new technology faster than any other segment of the software industry. Games are relevant.*

### Buying Power

Recently moved over to Australia, I had to fix up my new PC and one of my first sources for finding computer parts would be through the internet.

» "surely e-commerce will be tomorrow's way of shopping"

## post apocalypse



Surprisingly, all the major online computer stores do not offer Credit Card payments. Now, coming from countries where e-commerce is very developed, I find that rather unusual and inconvenient. You offer payment methods such as COD at the post office, but how do they expect people to carry such heavy equipment from the post office back home? One of the main reasons for shopping online is because they deliver to your door.

On one hand this country aims to produce more IT specialists for the technology to advance, but on the other hand the banks are not being supportive to e-commerce. Surely, e-commerce will be tomorrow's way of shopping for us and also it will also be one of the main sources of income for businesses.

Keith, email

## Letter of the Month: Joyless

Winner of this month's LOTM scores a Creative Sound Blaster Live Digital Entertainment card, worth \$249.

I'm a 65 year old ex R.A.F. veteran and into the flight sims FS 98, European Air Wars, Combat Sim 1, and when my system is upgraded, B17. I also play Red Baron 3D. Also I like driving games like NFS III, Spirit of Speed 1937, and even Midtown Madness II for a laugh.

Now for my big gripe directed at Microsoft. My Windows 98SE behaves impeccably, currently firing on Direct X 8.0 and I use Microsoft Sidewinder Precision Pro USB joystick, also a Dexxa wheel and pedals. Why is it, unless I'm totally in the dark, that Microsoft do not support two fully configured (3 axes + throttle + hat + at least 8 buttons) USB joysticks so that two people can play simultaneously - on suitably configurable games obviously - and likewise two wheel/pedal sets? Please tell me! I know you can get third party cards and yes a second joystick can be connected to the games port of the sound card, but if Win 98SE cannot configure these controllers in "Gaming Options" then there is Buckley's of it happening. With high speed USB it should be, a "piece of cake," in R.A.F. slang!

Robert Gott, email

*As far as we know - USB cannot be used to connect two joysticks, which is clearly outrageous. If any readers know of a workaround email us.*

**"I'm an electronic technician by trade. The article on the peltier device surprised me. It was actually accurate. So often have I had to correct people about some basic error"**

*That surprises us Keith, most sites we know of and use take credit card and do home delivery. Check out the companies in the back section of atomic, most if not all should meet your requirements.*

### Wulf Pack

The article on page 12 of issue 2 on the Athlon 'Samson' Supercomputer was fantastic, with my only complaint that it wasn't long enough. It generated questions that when written down were longer than the article. Amongst them were: What is a Beowulf Cluster design & how does it work/differ from other cluster designs?

Antal AKA po\_zest, email

*We agree completely, the Beowulf Cluster is undeniably cool and fascinating. Please make your way to page14 for one serious mother of a machine.*

### Case Closed

I'm an electronic technician by trade. The article on the peltier device surprised me. It was actually

accurate. So often have I had to correct people about some basic error. Mainly it was the belief of being able to run a peltier device without heatsinks and fans. But, an important tip: First, it is better to have the case completely on when using a peltier device. Next ensure there are plenty of fans extracting the air. The idea is to lower the air pressure as much as possible inside the case. This will reduce condensation on your precious CPU and motherboard. And finally, create a tube from the fan on top of the heatsink to an external point of the case. This will redirect the hot air outside.

David Aked AKA AccessDenied, email

*Although not intended specifically for peltiers, our case modding feature this month covers installing the CPU heat extraction tube you mentioned.*

### Keep Talking...

Atomic communication is also possible via our forums, which, by the way, are going off. Or for a real-time feast of communication join our IRC chatroom. Austnet #atomicmpc.

Send your questions to post@atomicmpc.com.au or by post to:

### Letters

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## competition




# WIN!

### Black and White

5 copies of this winner of a game up for grabs, thanks to Susy at EA.  
Q: Why weren't stars visible in the photos taken on the Moon by the Apollo astronauts?

### Serious Sam

5 copies of this incredible shooter, thanks to Leanne at Jack of all Games.  
Q: What is the name of the Egyptian goddess of cats?

### Fallout Tactics

10 copies of this addictive title thanks to Tony at Interplay.  
Q: Name the scientist who achieved the first sustained nuclear reaction, and where did it take place?

## atomic t-shirt photo competition

In droves atomic readers answered the call. Atomic t-shirts have been sighted in the strangest of places. Behold the winners! Each gets a 6 month sub, with Cynthia picking up the golden 12.




TOP: Note the newspaper under atomic, from J. Adams, Wahroongah NSW.

ABOVE: 'Mr Magoo' from Athelstone SA displaying his finest.

FAR RIGHT AND RIGHT: Cynthia Lawrence and Emily Richardson from Manly, NSW bring ancient and modern worlds together.

AND THE WINNER IS.... Cynthia Lawrence!

It was a close call, but Cynthia struck a pose just like a true atomic winner!

Please send all entries to:

**atomic**, Competition name, PO BOX 275, Beaconsfield, NSW 2014

Closing date for receipt of entries is 16/05/01 and announced in atomic 6



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fall out

&gt; Flame War Etiquette

# Flame War Etiquette

No matter how innocuous a forum can be there is always room for a flame war. Let's face it, we are all human, and we don't all live together in perfect harmony. A good flame war can make or break a person's reputation.

But let's take a step back first. The term flame war has been adopted to describe an argument that occurs on public forums and newsgroups. At heart a flame war is the public expression of a difference of opinion, but at the same time it can be so much more. It is a way to make friends and enemies for life, and to elevate oneself as the intellectual superior on any public forum.

## "One paragraph posts are not part of the flame war style."

The knee jerk reaction when someone flames you is to reply with the immortal phrase 'you suck'. This lacks a certain power, unless you post it 50 times (which is a valid tactic). A much better tactic is to think laterally. If you are going to refute any accusation remember to throw all spelling and grammatical rules out the window. Another important thing to keep in mind is that there is no middle ground. One paragraph posts are not part of the flame war style. Either make it one sentence or try and push the word limit on the forum to breaking point.

But it is not so much what you say but how you say it. Luckily a lot of forums allow the use of html tags within posts. This opens up a whole realm of possibilities for the thinking flamer. Remember the saying a picture is worth a

thousand words? Of course you do, but a crudely drawn caricature done in MS Paint is worth two thousand at least, especially if you add some crooked and misspelt words with the paintbrush tool. The resulting image should be at least a megabyte in size, to make your flame war readers truly quake in fear as they wait for it to load. Any image should also be at least 2,000 pixels wide so it forces the lucky readers to get acquainted with the scroll bar on the bottom of their screen. If images aren't your style, try embedding large flash animations that you have blatantly pinched from another Web site, this was the reason that All Your Base Are Belong To Us was made. The best flash animations to add are those ones that everyone on the face of the planet have already seen. Twice.

The ability to embed sound files in a post is a prominent tool in the flamer's arsenal. Readers will be in awe when they open a thread to be greeted with a crappy midi version of the Neighbours theme, or one of The Proclaimers greatest hits. Quotes from the Simpsons are also a fantastic source of insults.

The final tip is to not so much think of what you say, but how you say it. The only thing better than your intimate thoughts splashed across the page in 40 point Magenta italics is having them scroll as well. The html marquee tag is your friend, hit your favourite html resource and read up on it now.

Remember, when ensconced in a flame war it is not what you say, however logical, it is the sensory overload that you can impart while arguing. O





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